DIRECTORATE GENERAL OF HEALTH SERVICES
GOVERNMENT OF INDIA

VIRAL HEPATITIS
SURVEILLANCE

NATIONAL INSTITUTE OF COMMUNICABLE DISEASES
22-SHAM NATH MARG, DELHI-110054.

1986

749

COMMUNITY HEALTH CELL

VIRAL HEPATITIS SURVEILLANCE

Editor

P.N. SEHGAL, FAMS.
DIRECTOR, NICD, DELHI

NATIONAL INSTITUTE OF COMMUNICABLE DISEASES
22, Sham Nath Marg, Delhi - 110054

749

DIS300

COMMUNITY HEALTH CELL
47/1, (First Floor, St Marks Road,)
Bangalore - 560 001.

CONTENTS

		Page
	Preface	
1.	Annual Review Meeting of the Programme Officers of Viral Hepatitis Surveillance Centres - September 25 - 26, 1986	1-18
2.	Reports from the Regional Surveillance Centres for Viral Hepatitis	19
2.1	Work done at All India Institute of Hygiene and Public Health, Calcutta	19
2.2	Work done at School of Tropical Medince, Calcutta	20-24
2.3	Work done at All India Institute of Medical Science, New Delhi	25-30
2.4	Work done at National Institute of Communicable Diseases, Delhi	31-41
2.5	Work done at Madras Medical College, Madras	42-46
2.6	Work done at Haffkine Institute, Bombay	47-50
2.7	Work done at National Institute of Virology, Pune	51-56
2.8	Work done at B.J. Medical College, Ahmedabad	57
2.9	Work done at Post-graduate Institute of Medical Education and Research, Chandigarh	58-62
2.10	Work done at Institute of Preventive Medicine, Hyderabad	63

contents (contd.)

3. **Annexures:**

Annexure - I	List of Participants	64-66
Annexure - II	Programme of the Annual Review Meeting	67-68
Annexure - III	Surveillance of Viral Hepatitis in India - Importance and Impact	69-71
Annexure - IV	Proformae	
	A) For Hepatitis Surveillance	72
	B) For use of Blood Banks	73

PREFACE

Viral Hepatitis is a strikingly prominent infectious disease of international importance. Till date, there is no specific therapy and prophylaxis is of limited help. The medical problems and costs associated with it are enormous and likely to remain a challenge to medical profession for decades to come. India has faced epidemics of viral hepatitis from time to time and sporadic cases have been very frequent. Limited informations, non availability of sensitive and specific diagnostic facilities were the main constraints for an effective surveillance of viral hepatitis in India. However, Directorate General of Health Services (DGHS) initiated a nationwide surveillance in September, 1984 through ten regional centres, NICD being the coordinating apex body. Some of the important activities of NICD besides routine surveillance in different hospitals and outbreak investigations, were publication and distribution of manuals on laboratory aspects of viral hepatitis, bibliography on Indian literature on viral hepatitis and manuals on epidemiological surveillance of common epidemic prone diseases including viral hepatitis. Three meetings of the representatives from the regional centres were held at NICD to prepare manuals for laboratory diagnosis and epidemiological surveillance. ELISA kits were procured from WHO and were distributed. A 3-day National Workshop on Hepatitis Surveillance was held at NICD for the representatives of various regional centres with the objectives of reviewing the work done by each Centre and planning for the appropriate use of ELISA kits. A proceeding was published by compilation of the papers submitted by various centres and included the minutes of the meeting.

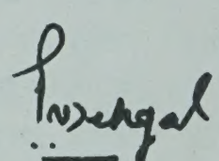
The objective of the present meeting had been the evaluation of ELISA kits and other serological tests, the efficient functioning of the sentinel centres and finding out the solutions to the practical problems faced towards an effective implementation of surveillance programme.

My grateful thanks are due to WHO for their financial assistance for this project. I take this opportunity of thanking the Directorate of Health Services of the States who sponsored their officers to the workshop. Appreciative

thanks are due to my colleagues Dr. (Mrs.) Sudershan Kumari, Deputy Director, Microbiology Division, and Dr. K.B. Banerjee, Deputy Director, Epidemiology Division and the officers in their division for organising this workshop so successfully.

I place on record my special thanks for Dr. (Mrs.) Sudershan Kumari, Deputy Director, NICD, Dr. (Mrs.) Krishna Ray, Assistant Director, NICD, Dr. (Mrs.) Mary Sebastian, Senior Medical Officer and Dr. D. Chattopadhya, Assistant Director, NICD, Delhi for very ably assisting me in editing this proceedings and getting it printed in a short time. Last but not the least, I thank all those who pooled their efforts for the successful completion of this workshop.

I shall feel this effort of ours rewarded if this document proves helpful to those working in the field of Viral Hepatitis.



(P.N. SEHGAL)
Director
NICD, DELHI

1. ANNUAL REVIEW MEETING OF THE PROGRAMME OFFICERS OF "VIRAL HEPATITIS SURVEILLANCE CENTRES" SEPTEMBER 25 - 26, 1986

1.1 Introduction

Viral hepatitis is a major public health problem in India. It is amongst the first ten leading causes of morbidity and mortality in the country. Till recently, the data regarding viral hepatitis were obtained only from outbreak investigations and from certain special studies carried out. This did not give the complete picture of the problem. In order to have an effective surveillance system, a seminar was held at N.I.C.D., Delhi, from January 24-28, 1984 to prepare a national action plan. Two more national workshops followed in May, 1984 to prepare two manuals, one on laboratory procedures of Viral Hepatitis and another on epidemiological surveillance procedures for selected epidemic-prone diseases including Viral hepatitis. With the assistance of WHO, the National Viral Hepatitis Surveillance Programme was launched in September, 1984 with objectives to have an effective nation-wide surveillance system involving epidemiological, clinical and laboratory components and further to formulate and implement control measures all over India depending on data obtained.

NICD on behalf of DGHS was designated as the coordinating Centre for the activities of the ten Regional Surveillance Centres under the programme, NICD also being one of the regional centres. These regional centres were started with the original objectives of carrying out the following activities.

1. Epidemiological investigation of outbreaks.
2. Laboratory investigation of viral hepatitis.
3. Strengthening of routine surveillance.
4. To establish priorities in research and to work out additional resources.

The first annual meeting-cum-workshop on Viral Hepatitis surveillance was held in July, 1985 at NICD in which the Programme Officers from the ten regional

centres participated.

To review the activities carried out after the first meeting, a second meeting was held at NICD in September, 1986, with the following objectives:-

1. To evaluate the comparative results of tests done with ELISA test kits supplied during the last meeting with the results of other test methods.

2. To share the experiences of investigations of hepatitis outbreak in the community, if any.

3. To discuss about the ways and means of actively involving the sentinel centres in the surveillance programme.

4. To find out the practical difficulties faced in the implementation of the programme by each regional centre as well as by NICD as the coordinating centre.

5. To find out ways and means to improve the functioning of the programme.

1.2 **Inauguration**

The meeting started with the welcome address by Dr. P.N. Sehgal, Director, NICD, Delhi.

In Director's welcome address, he gave a summary of the history of the programme and stressed the need to work hard since there are glaring difficulties like lack of co-operation even from the medical personnel to collect the data and the lack of funds to carry out this expensive programme. He also mentioned that all attempts should be made to start manufacturing test reagents and vaccines in our country to cut down the expenditure.

The main objectives of the meeting were read out by Dr.(Mrs.) S. Kumari, Deputy Director, Microbiology Division, NICD. Dr. K.B. Sharma, DDG(M) in his inaugural address stressed on the need for determination of the magnitude of the problem in developing countries like

India. He pointed out that in developed countries although the incidence of water-borne epidemics as well as sporadic cases due to Viral Hepatitis A have gone down considerably, the incidence of blood induced viral hepatitis is still quite high in spite of mandatory screening of blood donors and exclusion of Australia antigen positive blood. This is due to the serious problem posed by non A non B hepatitis which in most cases are blood induced. In contrast, non A non B hepatitis produces water-borne epidemics in developing countries like India. This type of hepatitis is still not possible to diagnose in the laboratory. He felt the need for the production of indigenous reagents and vaccine keeping in view the high cost of these items.

Dr. N.K. Shah, Senior Public Health Administrator, WHO, New Delhi was the Chief guest. He mentioned that viral hepatitis is not only a communicable disease but also is characterised by serious sequelae e.g. hepatocellular cancer, cirrhosis, which poses a serious problem for WHO's goal of 'Health for all by 2000 A.D.' According to the available information with WHO, during last 10 years, sporadic epidemics have been reported from Burma, India and Nepal, most of them being of non A non B variety. He informed about the trial of plasma derived vaccine in China and South Korea and the limitations of this vaccine. He stressed the need for identification of risk groups, and study of the epidemiology specially the mode of transmission in Indian situation.

The inaugural session concluded with vote of thanks by Dr. K.B. Banerjee, Deputy Director, Epidemiology Division, NICD.

Programme officers/representatives from all the ten surveillance centres except B.J. Medical College, Ahmedabad, Post-graduate Institute of Medical Education and Research, Chandigarh attended the meeting (List of participants - Annexure 1).

1.3 **Programme** - (See annexure 2).

1.4 **Guest Lecture**

The inauguration ceremoney was followed by a guest

lecture delivered by Prof. N.C. Nayak, Head, Department of Pathology, All India Institute of Medical Sciences, New Delhi. The short write-up of the lecture is annexed (Annexure 3).

1.5 Reports from Surveillance Centres

After the guest lecture, the following centres presented their reports and the summary is given below:-

1.5.1 All India Institute of Hygiene & Public Health, Calcutta

The only reports for hepatitis received from the Centre are of outbreaks. In an outbreak in Garden Reach Railway Colony lasting for 12 months, 137 (0.95%) out of 14,730 individual were affected. There was a proponderance of adults being affected (93.1%) as compared to children (6.9%) and males were mostly (88%) affected. Water testing revealed high faecal contamination and the outbreak was presumed to be of non A non B origin.

1.5.2 School of Tropical Madicine, Calcutta

This centre reports that 1400-1500 institutional cases of hepatitis with a case fatality rate of 10-14% occur in West Bengal as recorded by State Bureau of Health Intelligence. Besides these, outbreaks of hepatitis occur in different districts of West Bengal.

Different studies carried out by this centre can be given under the following heads. They are:-

(i) Prevalence of HBsAg in apparently healthy Calcutta population. The observation was that 2.8% was the carrier rate among healthy population.

(ii) Prevalence of HBsAg in Hepatic and non hepatic disorders in Calcutta. HBsAg positivity among acute hepatitis, cirrhosis liver and carcinoma liver patients were 14.7%, 9.3% and 20% respectively.

Non hepatic disorders studied were chronic Kala azar, Diabetes mellitus, Tuberculoid leprosy, Lepromatous leprosy and Bowel disorders like chronic colitis, dyspepsia etc. In chronic Kala azar HBsAg positivity rate was 9.7%,

in the rest it was much lower like 4.4%, 2.2% etc.

(iii) HBsAg in leprosy patients of Calcutta - its prevalence and subtypes.

The incidence of HBsAg among Lepromatous leprosy patients was 3.8% and among Tuberculoid leprosy patients 2.5%. None of the antigenic subtypes could be related to any particular type of leprosy.

(iv) Incidence of HBsAg in liver diseases and blood donors, Calcutta.

Incidence of HBsAg were as follows:-

Viral Hepatitis	-	26.66%
Cirrhosis	-	32%
Chronic active hepatitis	-	26.65%
Primary carcinonia of liver	-	26.66%
Professional blood donors	-	5%

(v) Nosocomial spread of hepatitis B virus in Calcutta Hospitals.

From the study, it was evident that the HBV infection among surgeons was ten times more than those working in Medical Units and about three times more than the normal population.

The different types of services rendered by this Centre are diagnostic services, investigation of outbreaks and training of medical and paramedical persons in Calcutta.

Three epidemics were investigated in Calcutta and its neighbouring areas in 1985 and 1986 during summer months. From the findings, it appeared that the epidemics may be due to NANB infection.

A serological investigation of prevalence of HBsAg in Dadra Nagar Haveli in the Western coast of India was conducted by the Centre with sera samples received through AIIHPH, Calcutta. The HBsAg prevalence was found to be 2.1%.

1.5.3 All India Institute of Medical Sciences, New Delhi

Testing of samples for HAV and HBV markers from

an epidemic in Ranchi (Bihar) revealed a positivity of 2.9% for HBsAg and 28% for IgM anti-HAV while in another epidemic in Kanpur (U.P.) the incidence was 11.5% and 8% for HBsAg and IgM anti-HAV respectively. 1.5% of the blood donors from blood banks were found to be positive for HBsAg by micro ELISA technique.

The overall positivity for HBsAg and anti-HBs was 1.38% and 20% respectively among the employee of AIIMS. It was observed that this incidence was no different from that of general population and no particular group of employee was at special risk.

A significant incidence of Hepatitis B was detected in post transfusion hepatitis in prospective as well as retrospective study.

Administration of Immune Serum Globulin (ISG) at six months interval to the nursing students of AIIMS was found to have protective effect since none of the recipients suffered from any attack during the study period of 4 years in contrast to earlier reported incidence, of 1-3 cases out of 40-50 students. The preliminary data upto a 6 month follow up period to study the role of ISG, ISG high titre (ISG, H.T.) and Hepatitis B Immune globulin (HBIG) in preventing post-transfusion hepatitis are encouraging. Study of DNA polymerase activity in fulminant hepatitis showed indication of continuation of HBV multiplication in about half of the patients. Similar activity was also found in chronic liver diseases. Evaluation of ELISA technique to study the binding between HBsAg and Polymerised human serum albumin as well as for the detection of IgG and IgM anti idiotypes directed against anti-HBs molecule showed encouraging results. Some other important studies related to the pathogenesis of hepatic involvement in HBV infection-covered the demonstration of Polymerised human serum albumin receptors on liver cells and viruslike particles in liver biopsies studied under electron microscope.

1.5.4 National Institute of Communicable Diseases, Delhi

NICD carried out surveillance work in Uttar Pradesh, Bihar, Rajasthan and Delhi.

In U.P., 4 sentinel centres were identified. They are: (1) M.L.N. Medical College, Allahabad, (2) J.L.N. Medical College, Aligarh, (3) K.G. Medical College, Lucknow and (4) Institute of Medical Sciences, B.H.U., Varanasi.

The data from these centres do not show a complete picture since they were not obtained for the whole year. From the data received from D.H.S., Lucknow, U.P. it is found that a total of 1038 cases with 41 deaths occured during 1985. Out of these 343 (33%) were from Allahabad and 252 (24.3%) were from Shahjahanpur districts. Past record of data also indicates prevalence of viral hepatitis in Shahjahanpur district. During 1986 upto August, 620 cases with 37 deaths were reported from U.P. of which 411 cases and 36 deaths occurred in Kanpur district alone. It is thus revealed that viral hepatitis is a major problem in this state.

In Bihar, though 3 sentinel centres viz. Patna, Dhanbad and Ranchi Medical Colleges identified, no data regarding viral hepatitis is received till now.

In Rajasthan, 3 sentinel centres viz. Medical College Hospital, Jaipur, Udaipur and Jodhpur were identified. In addition General hospital, Alwar started reporting of viral hepatitis in August, 1986. Medical College Hospital, Jaipur reported only 19 cases with 3 deaths during the period September, 1985 to August, 1986. This may be due to under reporting as cases diagnosed as jaundice have not been notified as viral hepatitis. Medical College Hospital, Udaipur reported 477 cases with 9 deaths. Gneral Hospital, Alwar reported 93 cases and 4 deaths from January, 1986 to August, 1986.

In Delhi, during 1985 a total of 558 cases and 46 deaths were reported from 4 major hospitals and one CGHS dispensary. One epidemic in East Kidwai Nagar was investigated which showed 35.7% positivity for HAV infection.

Laboratory surveillance work carried out at NICD included:-

- Study on the prevalence of HBsAg carriers among blood donors of Delhi and U.P.

- Study on the incidence of different types of viral hepatitis among jaundice patients of Delhi and U.P.
- Laboratory investigation of epidemics.
- Study on the prevalence of HBsAg carriers among STD patients prostitutes and prisoners.

Study on the prevalence of HBsAg among blood donors revealed a very high prevalence rate viz. 21.7% among Delhi blood donors and 44% among U.P. blood donors. This high prevalence rate may be due to the screening of professional donors in U.P. or may be due to the wrong practice of using the same pipette for transferring the different sera samples in the blood banks and other centres.

Prevalence of Hepatitis A in normal adult population (as detected by HA VAB) was found to be 90.7% in Delhi and 85.1% in U.P. In contrast, prevalence of Hepatitis B were 33.8% in Delhi and 85.1% in U.P.

The incidence of different types of Viral hepatitis among jaundice patients of Delhi was as follows:-

Hepatitis A infection 43.9%, B infection 29% and the remaining 27.1% may be NANB infection.

The incidence of different types of hepatitis among jaundice patients of U.P. was as follows:-

Hepatitis A infection 36.2%, B infection 17.2% and the remaining 46.6% may be NANB infection.

The IgM antibody to HBc was tested in some HBsAg positive patients which revealed the importance of carrying out this test to diagnose hepatitis B infection. HBeAg carrier rate among jaundice patients was found to be 75% and among blood donors it was 58.6%.

Out of the four epidemics investigated, three did not show evidence of hepatitis A or B infection. So this could be due to NANB infection. In one epidemic, 35.7% of the samples were positive for Hepatitis A infection.

The prevalence rate of HBsAg among STD patients, prostitutes and prisoners were 13.3%, 20% and 10.1%

respectively.

1.5.5 Madras Medical College, Madras

Sera samples collected from patients, blood banks and staff of the Institute were tested for the presence of HBsAg by ELISA and RPHA. Among 110 patients, 72 (65.4%) were positive by ELISA while HBsAg was detected only in 13 (11.8%) samples by RPHA. Out of 30 blood donors 9(30%) were positive for HBsAg by ELISA, while 2(6.6%) were positive by RPHA. In the risk groups, like hospital staff, 2 had HBsAg by ELISA out of 15 samples tested.

ELISA was found to detect by far more number of HBsAg positive cases as compared to RPHA. The overall incidence was slightly more in females and the predominant age group affected was 21-40 years.

1.5.6 Haffkine Institute, Bombay

Four epidemics were investigated by this centre. All of them were water-borne, three of them occurred in the autumn season while one was during summer. From the laboratory investigation it appeared that all the four epidemics were due to infection other than hepatitis A or B and therefore, may be due to NANB infection.

Another study being carried out at this Centre is the study of sero-conversion rate in the vaccinated hospital staff. Panic arose for the Hepatitis vaccination among the hospital staff after the death of a doctor due to hepatitis B infection. 172 suspected persons were vaccinated after screening for HBsAg and Anti-HBs. Post vaccination sero-conversion study is yet to be completed.

1.5.7 National Institute of Virology, Pune

The work carried out at this Regional Centre can be summarised as follows:

i) **Epidemic investigations:**

Two epidemics one at Ahmedabad and another at Rabkavi-Banahath village, 90 km. from Bijapur, Karnataka State were investigated. From laboratory investigations, it appeared that both may be due to NANB infection.

ii) **HBsAg screening in blood banks - Comparison of test mathods like DCIEP, RPHA, ELISA and RIA:**

In this study, it was found that DCIEP is not suitable for routine application in blood banks on account of its lack of sensitivity. ELISA and RIA were found to be the most sensitive methods. RPHA also was found to be good for routine screening. Taking into account the cost effectiveness, RPHA may be used in blood banks in India for routine screening.

iii) **Surveillance of viral hapatitis in dialysis units:**

HBsAg prevalence among dialysis patients was 38.4%. Among the staff it was 7.27%.

iv) **Visualisation and attempts to isolate NANB:**

Out of the 27 stool samples examined by election microscopy one showed virus like particles which showed immunoaggregation with pooled NANB convalescent serum.

v) **Delta infection among HBsAg positives from Pune:**

In this study, children and viral hepatitis patients did not show anti-delta antibodies. 13.63% of commercial donors 6.8% of voluntary donors showed anti-delta antibodies. Anti-delta positive donors were also positive for HBV DNA.

vi) **Delta agent antibodies in immunoglobulins:**

Eight out of twenty-four lots of NHIG were positive for anti-delta antibodies. In India categorical diagnosis of viral hepatitis is not made before injecting NHIG to either patients or their contacts. Hence it is likely that delta hepatitis may be transmitted to some HBsAg positive patients/carriers.

vii) **Studies on HBV DNA:**

14/32 sera from volunteer donors and 20/40 sera from commercial donors were positive for HBV DNA.

viii) **Diagnostic significance of anti-HBc IgM in patients of acute viral hepatitis:**

Anti-HBcIgM detection was found to be significant in finding out actual recent infection in HBsAg positive patients. It was also helpful in detecting B infection in HBsAg negative patients.

ix) Detailed long-term clinical and serological follow up study on carriers of HBsAg is going on (a) to find out the proportion of healthy HBsAg carriers developing chronic liver diseases; (b) to get base-line data regarding the nature of exposure of close contacts of these carriers.

x) Screening of high risk groups like prostitutes, STD patients is in progress.

xi) Confirmation of doubtful results from various blood banks in Pune is also being carried out.

1.5.8 **B.J. Medical College, Ahmedabad**

861 sera samples from hepatitis patients of isolation ward were tested for HBsAg by RPHA method. Of these 24.5% were positive. Among the blood donors the average HBsAg positivity rate was about 2% by RPHA method. A statement of the number of hepatitis cases and deaths in the different districts of Gujarat was also supplied.

1.5.9 **Post-graduate Institute of Medical Education and Research, Chandigarh**

The regional centre at Chandigarh screened 1266 patients with various hepatitis and related diseases for the prevalence of hepatitis B surface antigen (HBsAg) during 1985-86. Initially, discontinuous counter current immuno-electrophorasis was employed and later it was replaced by micro ELISA technique. Delta virus antigenaemia was detected in 14.3% of acute hepatitis B patients, 37.5% chronic renal failure patients, 4.6% of chronic hepatitis patients and 1 out of 10 healthy voluntary blood donors.

By employing the Abbot's HBsAg ELISA kit, HBsAg was detected in 15(30.6%) of 49 acute sporadic hepatitis

B cases, 3(37.5%) of the B chronic liver disease patients and 3(30%) of 10 healthy blood donors.

Among the medical persons at PGI, Chandigarh, HBsAg was detected in 4% and antibody to HBsAg was detected in 10.9%. The carrier rate was higher in doctors (20%) and laboratory attendants (25%) than in other groups. The relative prevalence of HBsAg was slightly higher as compared to normal population.

HBsAg was found to have an incidence of 3.8% among the healthy blood donors tested by Micro ELISA technique. A separate study among 31 children showed HAV IgM antibody in 24(77.9%) using Abbot kits.

1.5.10 Institute of Preventive Medicine, Hyderabad

Sera samples from 389 viral hepatitis patients were collected and tested for hepatitis A and hepatitis B. Non A non B infection was determined by exclusion. Sample collection was limited to the twin cities of Hyderabad and Secunderabad.

278 (71.2%) of the cases were positive for HBsAg: 22(5.7%) were positive for HAV-IgM antibodies. By exclusion 23.1% were identified as non A non B hepatitis.

1.6 Discussion

The discussion following the presentation of reports by individual participants highlighted many valuable facets regarding surveillance of Viral Hepatitis in India.

Many important epidemiological features relating to different epidemics were discussed. In Calcutta, consumption of contaminated water due to acute shortage of chlorinated drinking water explained the peak incidence of viral hepatitis in summer while in the remaining parts of the country, rainy season accounted for the majority of the outbreaks. No apparent reason was found out why the females were relatively free from attacks in the community. The higher incidence of viral hepatitis among the professional blood donors was explainable by their low socio-economic conditions. In some studies, the low carrier rate in the blood donors could be explained by the fact that they were healthy young adults mostly

from higher socio-economic status, the blood donors being from schools, NCC camps, colleges, etc.

In the laboratory front, the discussions included the steps needed to be taken for the limited shelf life of the test kits, the need of repeat testing in weak positive or borderline cases, use of reference serum to cross-check the variations of results in different laboratories. The role of reference laboratory in this regard was also discussed. It was further emphasised that the techniques for the collection and transfer of sera need to be properly adapted since high positivity rates have been reported due to the use of same pipette for different sera samples.

1.7.1 On the 2nd day, a Guest Lecture was delivered by Dr. K.K. Dutta, ADG, DGHS on "The problem and prospects of viral hepatitis surveillance programme in India." After giving the historical background, he stressed the necessity of introducing the prevention component in the surveillance. He also stated that for a proper co-ordination, the administrative nodal officer in district, state or centre should be well identified. He pointed out the need for the establishment of a referral centre for testing of samples to ensure quality control.

1.7.2 In the discussion that followed Dr. K.K. Dutta's lecture, it was felt that NICD should continue as the co-ordinating centre on behalf of DGHS. There was suggestion that N.I.V., Pune and A.I.I.M.S., New Delhi should act as referral centre also in addition to being Regional Centres. There was a feeling that the number of surveillance centres should be increased at least one Centre for each State, and the objectives already defined should be properly implemented. In connection with this, there were suggestions from some of the participants to link up Hepatitis Centres with AIDS Centres in order to have maximum utilisation of laboratory facilities. Periodic meeting with State DHS's will be necessary to get co-operation from the States. Though order has been issued for the mandatory screening of blood donors, only 20-30% of blood banks are found to be following it. So the duty of checking this was entrusted to the regional centres for getting the help from the state health authorities.

1.8.1 This was followed by a lecture by Dr. K.B. Banerjee, Deputy Director (Epid.), NICD on "The importance of sentinel centres in the surveillance of Viral Hepatitis." He defined the method of selecting the sentinel centres under various regional centres and the need for funding these sentinel centres.

1.8.2 Following the lecture on sentinel centes by Dr. Banerjee, there was discussion on the mode of selection of sentinel centres and the financial implications involved in it. Opinion varied among participants as to whether Medical Colleges or District Hospitals should be selected as sentinel centres. It was decided that it would be left to the convenience of Regional Centres to choose their respective sentinel centres, it was agreed that in the meeting of the DHS's the financial implications will be discussed.

1.9 Difficulties faced in the implementation of National Viral Hepatitis Surveillance Programme

1.9.1 Epidemiological Surveillance:

During discussion of the difficulties faced in the epidemiological surveillance, it was pointed out that many states are not aware of the Regional Centres and hence either same epidemic is investigated by several teams or they are investigated by a team from a Regional Centre to which the State is not allocated. It was felt that by having good coordination between the states and their corresponding regional centre this overlapping could be avoided.

It was also found that many Regional Centres could not identify their sentinel centres since they did not have support from the State Health Authorities.

1.9.2 Laboratory Aspects:

The following points were raised by the participants in the discussion on difficulties faced in laboratory surveillance of Viral Hepatitis.

- Insufficient number of kits available.
- Short shelf life of test kits and their arrival in the laboratory after the expiry date.

- Non-availability of Delta test kits and test kits for some more important markers.
- Lack of evaluation of various kinds of commercial test kits to find out the most suitable one in terms of cost, sensitivity and shelf life.
- Requirement for evaluation of Micro ELISA developed by A.I.I.M.S., New Delhi, by other Centres.
- Limited knowledge regarding feasibility of finger prick method of collection of blood samples for mass screening.
- Inadequate vaccination coverage of laboratory staff working in Regional Centres and determine action of their sero-conversion rate.

1.10 **Concluding Session**

The concluding session was chaired by Director, NICD. Dr. N.C. Nayak, Prof. and Head, Department of Pathology, All India Institute of Medical Sciences, New Delhi and Dr. S. Pattanayak, Medical Officer, WHO/-SEARO, New Delhi also participated and gave valuable suggestions. The draft recommendations were read out by Dr. Krishna Ray, Assistant Director, Microbiology Division. Each recommendation was discussed in detail considering the feasibility of implementation.

1.11 **Recommendations**

The following recommendations were made:-

1.11.1 NICD will continue to plan and co-ordinate the National Hepatitis Surveillance Programme all over the country.

- Attn:Director, NICD

1.11.2 To get co-operation from State Health Directorates for implementation of surveillance programme in the States, a meeting should be called at NICD with the DHS from each State and Programme Officers from the regional surveillance centres.

- Attn:Director, NICD

1.11.3 Regional Surveillance Centres need to be supported by providing laboratory reagents, chemicals and contin-

gencies. NICD should make a list of requirements for each centre according to its needs, based on number of States allocated to it, incidence of sporadic cases, number of epidemics investigated, etc.

- Attn: Director, NICD

1.11.4 For generation of data and samples for nation-wide surveillance, sentinel centres should be established in each region by the respective regional centres. The data may be collected in the proformae provided by NICD. The sentinel centres may be visited by the Programme Officers quarterly to augment the work. Periodic meeting of each Regional Centre with the Officer Incharge of the sentinel centres may be called by the Programme Officers of the regional centre.

- Attn: Director, NICD/Programme Officers of Regional Centres.

1.11.5 Wherever possible, outbreaks of hepatitis may be investigated by the regional centres within the region allocated to them and information should be sent to NICD.

1.11.6 Screening of blood donors for hepatitis should be made mandatory in all blood banks if facilities are not already existing. State Govt. should provide facilities to all Govt. Blood Banks under them for this purpose. Regional Centres may carry out periodic checking of blood banks in this region. Information regarding this may be sent to NICD in the prescribed proformae.

- Attn: DHS of each State and Union Territories/Programme Officer os regional Centre

1.11.7 Surveillance centres may be created in all the States. Wherever possible these centres may be linked with the AIDS Surveillance Centres for maximum utilization of laboratory facilities.

- Attn: Director, NICD

1.11.8 Regular feed back from Regional Centres to NICD should be ensured.

- Attn: Programme Officers

1.11.9 All India Institute of Medical Sciences, New Delhi and N.I.V., Pune in addition to their responsibility as surveillance centre may act as referral centre for Viral Hepatitis.

- Attn: AIIMS, New Delhi/NIV, Pune

1.11.10 For aetiological diagnosis of Viral Hepatitis, all surveillance centres will perform ELISA.

- Attn: All Regional Centres.

1.11.11 For screening of donors in blood banks, RPHA test should be performed. Periodically Regional Centres may carry out ELISA on random samples for cross checking.

- Attn: Programme Officers of Regional Centres.

1.11.12 Evaluation of Micro ELISA developed at AIIMS, New Delhi, should be carried out at NIV, Pune, NICD, Delhi and S.T.M., Calcutta. At the earliest possibility, NICD will supply a macro-test kit to AIIMS, New Delhi. Micro ELISA plates coated with specific antibody alongwith panel of control sera should be distributed by AIIMS to the above three centres. Micro ELISA will be carried out at each centre using these plates and control sera along with their own panel of control sera. Parallel testing of the sera with the conventional Macro test kit will also be carried out. Results of both macro and micro ELISA will be sent to NIV, Pune for evaluation.

- Attn: Director, NICD/AIIMS/NIV, Pune and S.T.M., Calcutta.

1.11.13 Comparative analysis should be carried out by NICD by collecting information regarding the cost, shelf life and availability of the different macro test kits available in the market. The kits may be procured and sent to NIV, Pune for evaluation regarding quality and shelf life.

- Attn: Director, NICD, Delhi
Director, NIV, Pune

1.11.14 Delta antibody kits may be made available

to all the Centres.

- Attn: Director, NICD, Delhi

1.11.15 At referral centres, feasibility for use of filter paper method of collection of blood samples for viral hepatitis surveillance may be evaluated.

- Attn: NIV, Pune/AIIMS, New Delhi

1.11.16 Vaccination of the laboratory staff with the imported plasma derived hepatitis B vaccine may be enforced. Follow up studies on sero-conversion may also be carried out.

- Attn: Programme Officers/Regional Surveillance Centres.

2. REPORTS FROM THE REGIONAL SURVEILLANCE CENTRES FOR VIRAL HEPATITIS

2.1 Work done at All India Institute of Hygiene and Public Health, Calcutta - A.K.Chakraborty and M.S. Das

The Institute was selected as a Centre for Viral Hepatitis Surveillance for the North Eastern States. Directors of the Health Services of the States and Union Territories in the region were informed of the establishment of surveillance centre including laboratory in the Institute. Kits for testing serum for HBsAg and Anti HAV have also been received.

Review of the work:

The only reports for hepatitis received are of outbreaks. Five outbreaks have been investigated since the establishment of the centre. Results of investigation of four outbreaks - two in Calcutta, one at Imphal, one at Shillong were presented in the last year's review meeting. Sentinel centres have been established at Regional Medical College Hospital, Imphal and CGHS dispensaries in Calcutta. Efforts are being made to establish sentinel centres in the other States and U.Ts.

An outbreak of Viral Hepatitis occurred during March-April, 1986 in the Garden Reach Railway Colony, Calcutta. In the outbreak 137 out of 14,730 were affected giving an attack rate 0.95%. The outbreak lasted for 12 weeks. About 91% of the cases were in the age group 15-54 years and only 6.9% of the cases were in children below 15 years. About 88% of the cases were in males. Serological examination did not reveal any evidence of Hepatitis A and Hepatitis B infection. The cases were uniformly distributed throughout the colony. Water was found to be contaminated. In view of the explosive nature of the outbreak and contamination of water, it was concluded that the outbreak was waterborne and it was caused by non A non B virus.

2.2 Work done at School of Tropical Medicine, Calcutta

- M.S.Chakraborty, S.K. Chakravarti, K.K. Mukherjee, P.N. De

2.2.1 Prevalence of HBsAg among acute viral hepatitis patients

A total of 403 viral hepatitis cases were referred to the centre by physician-in-charge of different city hospitals for investigation of HBV infection, since this viral infection is more common in the hospitalized cases. An account of monthly cases investigation for HBsAg positivity by employing ELISA test methods has been provided below:

Month-wise viral hepatitis cases investigation from July 1985 to June 1986

Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
7/28 (25.0%)	8/23 (34.8%)	9/26 (34.6%)	7/25 (28%)	9/28 (32.1%)	2/24 (8.3%)
Jan.	**Feb.**	**Mar.**	**Apr.**	**May.**	**Jun.**
18/39 (46.2%)	5/20 (25%)	9/23 (39.1%)	8/57 (14.03%)	14/81 (17.3%)	13/29 (44.8%)

Total
109/403 (27.04%)

It may be observed from the table that HBV infection could be established in as low as 14.03% to as high as 46.2% of the hepatitis cases admitted in different months in the city hospitals in the current year. Rest of the cases could either be due to HAV or Non A Non B infection.

Low incidence of HBV infection amongst younger population suffering from viral hepatitis can be exemplified from the following table.

Table

HBsAg positivity of hepatitis case in Calcutta of different age & sex groups (1985-86)

Age in yrs.	Male	Female	Total
0-5	0/1	0/0	0/1 (0%)
6-15	7/39 (17.95)*	6/16 (37.5)	13/55 (23.63)
16-25	24/75(32.0)	5/30(16.66)	29/105(27.61)
26-35	18/83(21.68)	9/36(25.0)	27/119(22.68)
36-45	14/48(29.16)	4/9(44.4)	18/57(31.57)
46 & above	14/48(29.16)	8/18(44.4)	22/66(33.33)
Total:	77/294(26.19)	32/109(29.35)	109/403(27.04)

* Figures in the parenthesis denote percentage.

The evidence of Non A Non B infection as well as HAV infection in Calcutta population could be established with serum samples collected during epidemic outbreak of hepatitis in 1985, the details of which are as follows:

2.2.2 Epidemic outbreak of hepatitis in Calcutta in 1985

A large scale outbreak of hepatitis was reported in Calcutta and its neighbourhood from January to May with its peack in April 1985. A total of 536 cases with 74 deaths (14.0%) were recorded in different city hospitals, apart from local outbreaks in different parts of the city, some multistoreyed buildings with a large number of inhabitants were also affected. The localised outbreaks were explosive in nature within a period of 5-7 weeks and a common vehicle spread of infection (water) was suspected.

The results of laboratory investigations with 204 serum samples collected from different parts of the city during the period were as follows:-

HBV infection (HBsAg and/or HBcIg M-AB)	HAV infection (HAV-AB-IgM positive)	Non A Non B suspected by exclusion
71/204 (34.8%)	45/204 (22.1%)	88/204 (43.1%)

The present investigation revealed the significant role of Non A Non B agents followed by HBV and HAV in

COMMUNITY HEALTH CEL
47/1, (First Floor, St. Marks R
749

the causation of viral hepatitis in Calcutta in 1985.

2.2.3 Epidemic outbreak of hepatitis in suburbs of Calcutta (South Sub-urban Municipal Unit, Behala in 1986)

An outbreak of hepatitis was recorded in Behala area involving several wards during March to May, 1986. Case incidences were more in young and young adults, although children and elderly persons were not spared. There was involvement of persons of all socio-economic status and multiple cases in the same family could also be observed. History of recent needle prick or transfusion of blood and blood products was not available in any of the case. Several hundreds of cases were reported in the area involving all age and sex groups. The drinking water source was tap water supplied by Calcutta Municipal Corporation from Garden Reach storage, as well as local deep tube wells. The pond water with unhygienic environment was also used for domestic purposes.

A total of 46 representative samples of blood were collected by the investigating team of the centre from 80, 81, 119, 123, 126, 128 and 129 Municipal wards of the area. The age and sex group of the cases investigated have been provided in the following table.

Table

Age group (Yrs.)	Male	Female	Total
0-10	0	2	2
11-20	12	6	18
21-30	8	10	18
31-40	2	2	4
40 +	2	0	2
Total:	24	20	44

Etiologic diagnosis was attempted by detection of HBsAg and/or HBcIgM, HAV-AB-IgM with Abbot Commercial Kits. Results were as follows:

Hepatitis -A	Hepatitis - B	Non A Non B (suspected)
4/46 (8.7%)	0/46 (0%)	42/46 (91.3%)

It may be observed that the predominent role of Non A Non B is highly suspected with a negligible role of hepatitis A virus in the causation of this outbreak.

2.2.4 Outbreak of viral hepatitis in Alipore Central Jail, between March - May, 1986

An outbreak of hepatitis was recorded from March which lasted till May, 1986, involving the inmates of the Jail. Most of the cases were between 20-24 years of age, although it varied from 20 to 66 years. There was no history of needle prick or blood transfusion with the cases. Water supplied by Calcutta Corporation along with that from deep tube wells in jail compounds were used for drinking and other purposes. The Calcutta Corporation water supply was from Garden Reach Storage, the same source of Behala area, where outbreak of hepatitis had also been recorded. There was no history of consumption of edibles from outside, as those were not permitted.

The Total number of inmates of jail compound was approximately 1000 and 300 staff working inside the jail. Twenty cases were reported of which 2 occurred amongst the working staff. The cases were confined mostly from 4th week of March to 1st week of May, with maximum clustering of cases during 2nd to 5th week of April, 1986, stongly suggesting a common vehicle source infection in a closed community. A total of 14 blood samples were collected and tested and the results of investigations have been provided in the following table.

Table

Hepatitis A	Hepatitis B	Non A Non B suspected
3/14	*1/14	10/14

* Staff member residing outside jail campus.

Serological marker studies in the Alipore Central Jail outbreak suggest hepatitis A and Non A Non B infections in majority of the cases, and both these agents can spread through water.

2.2.5. Prevalence of HBsAg in Dadra Nagar Haveli

A serological investigation of prevalence of HBsAg in

Dadra Nagar Haveli, in the Western coast of India was conducted by the Centre with serum samples received through A.I.I.H.PH, Calcutta. A total of 96 samples were tested for this purpose; the details of which have been provided in the followint table.

Table

HBsAg prevalence in Dadra Nagar Haveli (1986)

	Age and sex groups (in years)												
	0-5		6-15		16-25		26-35		36-45		46+		Total
	M	F	M	F	M	F	M	F	M	F	M	F	
No. positive	0	0	0	0	0	1	0	0	0	0	1	0	2
No. tested	0	0	2	0	12	23	16	22	5	7	4	5	96 (2.08%)

It is evident from the table that the prevalence of HBsAg in apparently healthy population of Dara Nagar Haveili is 2.1% which corroborates with the findings in other parts of India.

2.2.6 **Summary of the serological tests performed for hepatitis virus by the Centre during the period under review (July 85 to June '86)**

For HBV

		No.tested	No. Pos.	%age
HBsAg testings by ELISA method		559 (samples)	111	19.85
HBcIgM	-do-	90	28	31.1
Anti HBs	-do-	40	8	20.0
HBeAg	-do-	18	10	55.5
Anti HBe	-do-	36	5	13.9

For HAV

HAV-AB-IgM	-do-	300	44	14.7

2.3 Work done at All India Institute of Medical Sciences, New Delhi - B.N. Tandon, Y.K. Joshi, B.M. Gandhi, M. Irshad, Hema Gupta, S.K. Acharya.

2.3.1 Study of an epidemic of viral hepatitis at Ranchi, Bihar

An epidemic of hepatitis was recorded amongst the employees of heavy engineering corporation (HEC) staying in the campus of the plant. When AIIMS team visited the place (March 31, 1986), 150 patients of AVH were admitted in 500 beded hospital. 104 blood samples were tested for HAV and HBV markers. Only three were positive for HBsAg and 12 were positive for IgM anti-HAV suggesting hepatitis B and A respectively. The epidemic was attributed to NANB infection. A recent follow up visit revealed that aproximately 2000 icteric cases were admitted in the plant hospital. Only one death was recorded in the hospitalized patients. Water contamination was the cause of the epidemic.

2.3.2 Study of an Epidemic of viral hepatitis at Kanpur (U.P.)

Recently an epidemic of viral hepatitis was recorded at Kanpur. 25 serum samples collected during the acute stage of epidemic were screened for markers of hepatitis A and hepatitis B. HBsAg was positive in 7(30%) patients. IgM anti-HBc was positive in 2 of these 7 patients while IgM anti-HAV was positive in 8% patients. The epidemic was attributed to be due to infection of Non-A Non-B hepatitis.

2.3.3 HBsAg screening in blood donors

About 13900 volunteer blood donors (Indian red-cross and AIIMS blood bank) were screened for HBsAg by micro-ELISA technique. 216 (1.54%) were found to be positive for HBsAg.

2.3.4 HBsAg and anti-HBs status among the employees of AIIMS

Six hundred and fifty employees of AIIMS, which included faculty members, resident doctors and nurses, were screened for HBsAg and anti-HBs. The overall positivity rate for HBsAg and anti- HBs was 1.38% and 20%

respectively which is almost similar as in the healthy population in the country (1.54%) indicating no high risk of infection to the hospital staff. HBsAg rate among the faculty members (2.80%), resident doctors (1.78%) and nurses (1.12%) did not show higher positivity rate than the general population. Among the positive persons group, one was faculty member, 4 residents, 2 nurses, one senior opthalmologist and one nursing orderly, suggesting no high risk to any specific group.

2.3.5 ISG for prophylaxis of hepatitis B and NANB

Nursing students entering the college (hospital environment) for the first time were given immune serum globulin (ISG) every six months. Earlier data showed that 1 to 3 students (from the batch of 40-50) used to get acute viral hepatitis type B or NANB during their study course of four years. None from the two batches of students who received ISG every six months, developed icteric hepatitis. Liver functions done every six months just before injecting ISG were normal in all the students during the study period.

2.3.6 Increasing HBV reservoir by post-transfusion HBV infection in India (Retrospective study)

Post-transfusion hepatitis due to hepatitis B virus was studied in patients of portal hypertension subjected to surgery during which they received 4.5 units of blood on average. These patients were followed up for a period of 9 to 88 months. Evidence of HBV infection in transfused patients was significantly higher in patients ($P< 0.001$). HBV carrier rate depended upon the number and source of units of blood transfused. Carrier rate was maximum (16.5%) when more than 10 units of blood transfusion from commercial source was given. NANB hepatitis virus was also implicated in few cases. Third generation screening test for HBsAg is suggested to prevent HBV infection in patients requiring blood transfusion.

2.3.7 Post transfusion hepatitis - (A prospective study)

Eighteen patients (12 males and 6 females) who underwent vascular surgery for portal hypertension were included for prospective follow-up of mean 7.3 $\pm$1.9 months. 12 patients had received mixed (commercial and

voluntary donors) blood (12.2 ± 7.3 units) before operation and one had received 4 units from AIIMS bank (voluntary donor). During operation all the 18 patients received blood transfusion (3.7 + 0.7 units) from voluntary donors. Post transfusion hepatitis was recorded in 3 of the 18 patients (16.6%). Hepatitis B virus (HBV) was aetiological agent in 2 patient and Non-A Non-B virus infection was concluded in the remaining one patient. The incidence of post transfusion hepatitis increased with increasing numbers of blood units transfused and transfusion of commercial donor's blood.

2.3.8 Role of Immunoprophylaxis in post transfusion hepatitis

A study has been carried out to assess the efficacy of ISG, ISG-high titre (HT) and HBIG in preventing post transfusion hepatitis (PTH) in blood recipients at AIIMS. 54 blood recipients have been registered for the study. 21 of these have completed six months of follow up. None developed HBsAg positivity. Two developed rising titres of anti-HBs indicating HBV infection without clinical or anicteric hepatitis. One of them received ISG and other one ISG-HT. Three patients developed mild anicteric PTH(NANB) with complete recovery (two of these had received HBIG). Anti-HBs was detected in 11 patients at the end of 6 months follow up which was presumed to be because of passive transfer of Anti-HBs from immunoglobulins or a vaccine effect from very low titre HBsAg in the donor blood or administered immunoglobulins. The follow up of remaining cases is continuing. The preliminary data of the 21 cases however suggest the possibility of prevention of PTH due to HBV by ISG, ISG-HT and HBIG. ISG being low cost may be mainly used and evaluated further.

2.3.9 DNA-polymerase activity in fulminant hepatitis

Presence of HBeAg and HBV specific DNA-Polymerase activity, regarded as markers of HBV multiplication, were studied in 40 patients of fulminant hepatitis B within one to five days of onset of hepatic encephalopathy. HBeAg and DNA-P were detected in 3(7%) and 21(51%) of the patients respectively. Only 3(7.1%) were positive

for anti-HBs. DNA-P activity was present even after 10 days of onset of icterus. Present findings suggest continuation of HBV multiplication in about half of the patients of fulminant B hepatitis and hence support the hypothesis that virus replication inhibiting agents may be beneficial to these patients.

2.3.10 HBV specific DNA polymerase activity in chronic liver diseases

The study was carried out to find the status of hepatitis B virus replication in HBsAg positive and HBsAg negative patients of chronic active hepatitis (CAH) (49), cirrhosis of liver (CL) (31), and HBV-carriers (65). DNA polymerase (DNA-P) activity was more frequently a positive marker of viral replication than HBeAg ($p=<0.001$). DNA-P positivity in HBsAg positive CAH, CL, and carriers was 81.8%, 72.7% and 50.8% respectively while in HBsAg negative patients, 52.6% of CAH and 44.4% of CL group were DNA-P positive. The study demonstrates very high prevalence of viral replication in chonic liver diseases.

2.3.11 The studies on binding between HBsAg and Polymerised human serum albumin (PHSA) by ELISA technique

A sample ELISA method has been developed to binding between HBsAg and PHSA in the sera samples from different HBV infections. PHSA was prepared by the standard biochemical techniques. Using 96 wells microtitre plate as the solid phase and commercial anti-HBs-HRPO as conjugate. ELISA test was performed in HBsAg positive sera, both with and without HBeAg, from acute viral hepatitis (42), fulminant hepatitis (12), cirrhosis (8), chronic active hepatitis (5) and healthy HBV-carriers (31). The binding activity was detected in 80 per cent of HBeAg positive patients, 71 per cent HBeAg negative patients and 58.3 per cent anti-HBe positive patients. Further, the binding was significantly high in HBsAg/IgM complex positive sera as compared to complex negative sera ($P<-0.001$). These results contradict the earlier findings that PHSAbinding is present only in HBeAg positive sera.

2.3.12 ELISA for detection of IgG and IgM anti-idiotypes directed against anti-HBs molecules

A simple and specific enzyme-linked immunosorbent assay (ELISA) has been developed to detect circulating IgG and IgM anti-idiotypic antibodies directed against anti-HBs molecules using 96-wells polyvinyl microtitre plate as the solid phase and HRPO-labelled goat-anti-HBs as conjugate. Anti-idiotypes were observed in the supernatant portion after precipitation of immune complexes from sera with polyethylene glycol 6000 (PEG). Both IgG as well as IgM anti-idiotypes were detected concurrently in HBsAg-positive sera from HBV-infected patients and asymptomatic HBV-carriers. Anti-idiotypes were absent in HBsAg-negative sera from healthy persons, non-A, non-B hepatitis and viral hepatitis-A. However, these antibodies could be demonstrated in the sera of 2 out of 8 HBsAg vaccine recipients negative for anti-HBs after taking booster immunisation dose of HBsAg-vaccine. The sera samples showing positive anti-idiotype reactions were free from rheumatoid factor and HBsAg/-IgM or HBsAg/IgG complex activity.

An analysis of anti-idiotypes positive sera for anti-HBs, HBeAg and HBV-specific DNA-polymerase activity demonstrated these markers in 20%, 30% and 60% cases respectively. The presence of anti-idiotypic antibodies was presumed to permit a more active multiplication of hepatitis-B virus.

2.3.13 Study of the mechanism of Hepatitis B virus entry in the liver cells

Yet it is not clearly understand how HBV enter the liver cell. Polymerised human serum albumin receptor (PHSA) is suggested to be the important carrier protein. Presence of such PHSA receptor was studied by incubating the liver cells with FITC conjugated PHSA-HBsAg. The preparation was examined with fluorescent microscope. Almost 30 to 40% of fulminant hepatitis and 10 to 15% of acute and chronic hepatitis type B were fluorescence positive. This study shows that PHSA probably plays the role of carrier protein for HBV infection.

2.3.14 Detection of virus like particles in liver tissues obtained from cases of acute NANB hepatitis

Five liver biopsies obtained from patients of NANB hepatitis (diagnosed by exclusion) were examined under electron microscope. The specimen were prepared by method of indirect immuno-peroxidase. Small dard brown virus like particles were detected in three of these five. Five other liver tissues obtained from patients of hepatitis B or amoebic liver abscess did not show any such particles.

2.4 Work done at National Institute of Communicable Diseases, Delhi

2.4.1 Epidemiological Surveillance - S.K. Das, K.B. Banerjee and V.J. Mahadik: Epidemiology Division

Surveillance work in Uttar Pradesh, Rajasthan, Bihar and Delhi is being carried out by this centre.

Uttar Pradesh:

Three sentinel centres one each in Motilal Nehru Medical College, Allahabad, Institute of Medical Sciences, Banaras Hindu University, Varanasi and K.G. Medical College, Lucknow had been identified in the State. But regular reporting has not yet been established. Partial report has been received by NICD from first two sentinel centres is as follows:

Institute of Medical Sciences, BHU, Varanasi

Data received for the period of 17.9.85 to 30.10.85. During this period 336 cases were reported with no death. Of this 66% were reported from the age group 15-49 years though no age group was found immune. Males were affected slightly more than that of female (1 : 1.4).

Motilal Nehru Medical College, Allahabad

A total cases of 233 with nil death were reported from this Institute of which 77.8% were reported from the age group 15-49 years.

In addition to these sentinel centres data received from the Directorate of Health Services, Uttar Pradesh revealed a total of 1038 cases with 41 deaths (C.F.R.4%) during 1985. Out of these, 343 (33%) cases were reported from Allahabad and 252 cases (24.3%) from Shahjahanpur districts. Past record of data also indicates prevalence of viral hepatitis in Shahjahanpur district. In 1984 of 664 cases 140 were reported only from this district. During 1986 up to the month of August 620 cases with 37 deaths were reported from U.P. State of which 411 cases and 36 deaths occurred in Kanpur district alone. It is thus revealed from the above that viral hepatitis is a major problem in this State.

Bihar:

Though three Sentinel centres viz. Patna Medical College, Patliputra Medical College, Dhanbad and Ranchi Medical College were identified in Bihar State, no data regarding viral hepatitis is received till now.

Data received from Sri Krishna Medical College Hospital, Muzaffarpur for the month of May 1986 shows 42 cases and 12 deaths. Data also received from Civil Surgeon, Patna for the period May and June 1986 revealed 306 cases and 28 deaths.

Rajasthan:

Three sentinel centres were selected for viral hepatitis surveillance in Rajasthan viz. Medical College Hospital, Jaipur, Udaipur and Jodhpur. In addition, General Hospital, Alwar started reporting of viral hepatitis cases only in August 1986.

Medical College Hospital, Jaipur

Between September 1985 and August 1986 this centre reported only 19 cases and 3 deaths. The low number was found to be due to under reporting as cases diagnosed as jaundice have not been notified as hepatitis cases and the OPD cases of viral hepatitis were not included in the report.

Medical College Hospital, Udaipur

A total of 477 cases (IPD 244, OPD 233) and 9 deaths were reported from September 1985 to August 1986.

General Hospital, Alwar

93 cases and 4 deaths were reported from this hospital from January 1986 to August 1986.

No reports were received for the Medical College, Jodhpur.

Seasonal Pattern: Incidence is found to be high during rainy season and low in the winter months.

Age and sex distribution: 18.8% cases occurred in the age group 1-4 years and 33.6% in 20-30 years, 80% cases occurred among males. Of 48 female one

was pregnant.

C.F.R: CFR was 5%. Case fatality among IPD cases of Udaipur Medical College was 5% which is fairly low as compared to medical college hospital, Jaipur and General Hospital, Alwar where it was 16% each.

Data from blood bank: Of 2574 samples 26 (1%) were found positive for Australia antigen.

Diagnostic test for Viral Hepatitis: Infrastructural facilities and expertise is available at all the above centres to conduct the diagnostic test for viral hepatitis but lack serological kits for these tests.

Delhi:

During 1985, a total number of 558 cases and 46 deaths were reported from the 4 major hospitals and one CGHS dispensary. 14 were pregnant women with 1 death. There was history of injection in 13 cases and of blood transfusion in 1 case. During 1986 up to the month of Auigust 312 cases were reported with 23 deaths. Among these 8 cases gave history of injection and 2 gave history of blood transfusion. Of 870 cases and 69 deaths, 660 cases and 35 deaths could be analysed age-sexwise. 70.3% cases occurred in the age group between 15-49 years though cases were reported from all age groups. 68.6% of the deaths occurred from the same age group. Males were affected 2.5 times more than that of female. No seasonal variation is observed during this reporting period.

In addition NICD also investigated an outbreak of viral hepatitis in East Kidwai Nagar during the month of June 1986. Of 2813 persons in 530 households 64(2.27%) were detected suffering from Jaundice. 71.87% of the cases were reported from age group between 10-29 years. Of 14 serum samples 5 (35.7%) were found positive for IgM antibody to HAV. The possible source of infection was consumption of contaminated hand pump water.

2.4.2 **Laboratory Surveillance:**
- M. Sebastian, S. Kumari, Krishna Ray and R.L. Ichpujani.

The work being carried out by the Centre at NICD, Delhi can be given under the following heads. They are:

(i) Study on the incidence of HBsAg carriers among blood donors of Delhi and U.P. under the National Viral Hepatitis Surveillance Programme.

(ii) Study on the incidence of different types of viral hepatitis among jaundice patients of Delhi and U.P. under the National Viral Hepatitis Surveillance Programme.

(iii) Laboratory investigation of Epidemics.

(iv) Study on the incidence of HBsAg carriers among STD patients, prostitutes and prisoners.

The Test methods used in this laboratory are as follows:-

Routine Test methods:

- ELISA for HBsAg detection - Auszyme
- ELISA for IgM antibody to HAV detection - HAVAB-M-EIA

Test methods for special purposes:

- ELISA for IgM core antibody - Corzyme M
- ELISA for Anti HBc - Corzyme
- ELISA for HBe antigen
- ELISA for antibody to HAV - HAVAB

Tests for comparison of the sensitivity:

- CIEP
- RPHA

(i) A study on the incidence of HBsAg carriers among blood donors of Delhi and U.P. - Collaborating centres in Delhi are Blood Banks of:

1) Safdarjung Hospital - Dr. V.H. Talib.
2) Dr. R.M.L. Hospital - Dr. Talukdar.

3) L.N.J.P. Hospital - Dr. Choudhury.

4) Hindu Rao Hospital - Dr. S.K. Sarin.

Collaborating Centres in Uttar Pradesh are the blood banks of:

1) Institute of Medical Sciences, BHU, Varanasi.

2) M.L.N. Medical College, Allahabad.

3) K.G. Medical College, Lucknow.

4) J.L.N. Medical College, Aligarh.

Results:

Table - 1

Incidence of HBsAg among blood donors

Sera samples from	No. of sera samples tested	HBsAg positive	% positive
Delhi Blood Donors	1074	233	21.7
U.P. Blood Donors	84	37	44

Table I shows that 1074 sera samples from Delhi Blood donors were tested by ELISA of which 233 (21.7%) were positive for HBsAg. All these blood donors were voluntary blood donors. 84 sera samples from U.P. blood donors were tested and 37(44%) were positive for HBsAg. A positivity of 21.7% is much higher than all previous reports from Delhi. The positivity of 44% from U.P. also is alramingly high. This high positivity may be due to the fact that U.P. blood donors included professional donors also or may be to certain wrong practices like use of same pipette to transfer the sera into vials in the blood banks.

Table - II

Prevalence of Hepatitis A and B infection in normal adult population

Sera sample from	No. of samples tested	HBsAg +ve	Anti HBc +ve	Total Hepatitis B infected	Anti HAV +ve (Hepatitis A infected)
Blood donors Delhi	204	* 17+9 (12.7%)	52	52+17=69 (33.8%)	185 (90.7%)
Blood donors U.P.	27	* 1+2 (11.1%)	22	22+1 =23 (85.1%)	23 (85.1%)

* These samples were HBsAg positive, but they were negative for anti HBc.

Table-II: 204 sera samples from Delhi blood donors and 27 sera samples from U.P. blood donors were tested for Anti HBc (Corzyme) and Anti HAV (HAVAB) to have a rough idea of the prevalence of hepatitis A and B infection in the normal adult population. Of course Anti HBs (Ausab) should also have been done to get a very complete picture. This table shows that the total B infection rate in Delhi is 33.8% whereas in U.P. it is 85.1%. There were 17 sera from Delhi donors and one serum from U.P. donors which were positive for HBsAg, but negative for Anti HBc. Such a finding we can expect only in early presymptomatic acute hepatitis. The hepatitis A infection rate in Delhi adult population is 90.7% and in U.P. adult population is 85.1%.

(ii) Study on the incidence of different types of Viral Hepatitis among jaundice patients of Delhi and U.P. under the National Viral Hepatitis Surveillance Programme:

The collaborating centres in Delhi are as follows:

1) Safdarjung Hospital - Dr. Das, Biochemistry Department.
2) L.N.J.P. Hospital - Dr. Malhotra, Biochemistry Division.
3) Hindu Rao Hospital - Dr. Anju Gupta, Deptt. of Clinical Pathology.
4) Smt. Sucheta Kriplani Hospital - Dr. Hemlata Gupta, Deptt. of Medicine.

Collaborating Centre in U.P. is:

M.L.N. Medical College, Allahabad - Dr. B.Raj, Dr. Jitender Verma, Deptt. of Preventive & Social Medicine.

Sera samples from clinically and biochemically diagnosed cases of viral hepatitis are tested for HBsAg and IgM antibody to HAV by ELISA.

Table - III

Results: Delhi patients - Agewise distribution of different types of Viral Hepatitis

Patients studied	No. of samples tested	HBsAg Positive	IgM anti-body to HAV Positive	NANB
Children upto 12 yrs. of age	24	4 (16.6%)	13 (54.2%)	7 (29.2%)
Age-group 13-65 years	105	36 (34.3%)	40 (38.1%)	29 (27.6%)
Age not known	26	5 (19.2%)	15 (67.7%)	6 (23.1%)
Total:	155	45 (29%)	68 (43.9%)	42 (27.1%)

Table-III shows the age-wise distribution of different types of viral hepatitis among Delhi patients. Out of the 24 children 4(16.6%) were positive for HBsAg and 13(54.2%) were positive for IgM antibody to HAV infection. The remaining 29.2% may be NANB infection. 105 sera from the age group 13-65 years were tested and 36(34.3%) were positive for HBsAg and 38.1% were positive for IgM antibody to HAV. The remaining 27.6% may be NANB infections. There were 26 sera samples from patients whose ages were not recorded. Out of those 19.2% were positive for HBsAg, 57.7% were positive for IgM antibody to HAV. The remaining 23.1% may be NANB infection. Thus out of the total 155 sera tested 29% were B infection positive, 43.9% were A infection and the remaining 27.1% may be NANB infections.

Table - IV

Delhi patients - Sexwise distribution of different types of Viral Hepatitis

Patients studied	No. of samples tested	HBsAg +ve	IgM antibody to HAV +ve	NANB
Males	94	26 (27.6%)	43 (45.7%)	25 (26.7%)
Females	61	19 (31.1%)	25 (40.9%)	17 (28%)
Total:	155	45 (29%)	68 (43.9%)	42 (27.1%)

Table-IV shows the sex-wise distribution of different types of viral heplatitis among Delhi patients. HBsAg positivity among males and females were 27.6% and 31.1% respectively. Hepatitis A infection rate among males and females were 45.7% and 40.9% respectively. The remaining 26.7% of males and 28% of females may be NANB infected.

Table - V

U.P. patients - sexwise distribution of different types of Viral Hepatitis

Patients studied	No. of samples tested	HBsAg +ve	IgM antibody to HAV +ve	NANB
Males	40	7 (17.5%)	17 (42.5%)	16 (40%)
Females	18	3 (16.7%)	4 (22.2%)	11 (61.1%)
Total:	58	10 (17.2%)	21 (36.2%)	27 (46.6)

Table-V shows the sex-wise distribution of different types of Viral hepatitis among U.P. patients. HBsAg positivity among males and females was almost equal being 17.5% and 16.7% respectively. Hepatitis A infection among males were 42.5% and among females were 22.2%. NANB infections among males were 40% and among females were 61.1%. Out of the total 58 sera tested, 17.2% showed B infection, 36.2% showed A infection and the remaining 46.6% may be NANB infection.

Table - VI

IgM antibody to HBc showing recent infection in HBsAg positive patients

No. of samples	IgM antibody to HBc +ve	IgM antibody to HAV +ve	Both the tests -ve	Both the tests +ve
24	6	11	5	2

IgM antibody to HBc was done in 24 sera samples to find out whether these HBsAg positive patients had recent infection.

Excluding the eleven IgM antibody to HAV positive samples, therewere thirteen HBsAg positive samples. Out

of these, 8 were IgM antibody positive to the HBc showing recent B infection and 5 were negative. These 5 samples may be from non A non B infection which we otherwise presumed to be B infection and this constitutes about 38.5% in this small number. This shows that in order to have the correct incidence rate of acute B infection in patients IgM core antibody test is the most ideal. It may also be noted that in 2 sera samples IgM antibody to HAV and HBc were detected simultaneously.

Table - VII

HBeAg carrier rate in HBsAg positive patients and blood donors

Sera samples from	No. of samples tested	HBeAg positive	% positive
Patients	16	12	75
Blood donors	46	27	58.6

Table-VII shows the HBeAg carrier rate among HBsAg positive patients and blood donors. They are 75% and 58.6% respectively showing the high infectivity.

Table - VIII

Comparison of RPHA with ELISA

Sera samples from	No. of samples tested	HBsAg positive by RPHA	HBsAg Positive by ELISA	Sensitivity ratio RPHA: ELISA
Blood donors	283	44(15.5%)	122(43.4%)	1:2.8
Hepatitis Patients	111	31(27.9%)	45(40.5%)	1:1.5

The RPHA test and ELISA were compared in their sensitivity. As is seen from the table, sensitivity ratio of RPHA to ELISA was 1:2.8 in the case of samples from blood donors whereas it was 1:1.5 in the case of samples from patients. This difference in the ratio may be explained as follows:

The high concentration of antigen present in patients is almost equally detected by RPHA and ELISA whereas in blood donors the concentration of antigen may be

low which is not detected by RPHA but is detected by the very sensitive ELISA. Out of the total 394 samples tested by both RPHA and ELISA, 5 were positive by RPHA but negative by ELISA which we took as non-specific positivity. Then the occurrance of non-specific positivity in our study by the use of Burroughs Wellcome RPHA test kit is 1.3%.

(iii) Laboratory Investigation of Epidemics:

Sera samples from four epidemic investigations were tested in this laboratory. The epidemics reported were from (1) Nurses Hostel, Raipur, Madhya Pradesh; (2) CRPF, Centre, Neemuch (M.P.); (3) Delhi Public School, R.K. Puram; (4) East Kidwai Nagar, New Delhi. Laboratory findings were not in favour of A or B infection in three of the four epidemics. Hence may be due to NANB infection. In the fourth one 35.7% of the samples showed A infection (Table-IX).

Table - IX

Laboratory Investigation of Epidemics

Sera samples from	No. of samples tested	HBsAg positive	IgM antibody to HAV +ve
1. Nurses Hostel Raipur (M.P.)	30	1	0
Nearby Campus	9	1	0
2. CRPF Centre, Neemuch, (M.P.)	29	0	0
3. Delhi Public School, R.K. Puram.	10	0	1
4. East Kidwai Nagar New Delhi	14	0	5

(iv) Study on the incidence of HBsAg carriers among S.T.D. patients, prostitutes and prisoners:

HBsAg prevalence in some other categories of people like STD patients, prostitutes, prisoners were also studied. They were 13.3%, 20% and 10.1% respectively. (Table-X)

Table - X

HBsAg prevalence among STD patients, prostitutes and prisoners

Sera samples from	No. of samples tested	HBsAg positive	% Positive
STD patients	165	22	13.3
Prostitutes	95	19	20
Prisoners	79	8	10.1

2.5 Work done at Madras Medical College, Madras:
- M.D. Vinayagam, K. Rajendran, M.V. Kanchana and C.S. Lakshminarayana

The work consisted of:

1. Diagnostic service to all the hospitals in the city.
2. Reference service - confirmation by ELISA to other centres.
3. Diagnosis of HAV by ELISA to Childrens Hospital and other hospitals.
4. Monitoring risk groups like Medical and Nursing staff Dialysis personnel.
5. Confirm the sensitivity and specificity of RPHA with ELISA.
6. Samples screening of blood donors.
7. Participation in workshop on Hepatitis held at Taramani in 1985.
8. Protection of Lab. personnel with vaccine given by the kind courtesy of NICD.
9. Advice, guidance and service to moffusil centres like Kancheepuram.
10. Screening of sera from epidemic of hepatitis in Madras.

The following tables summarises the work done by our Centre:

Table - I

Total number of sera studied for the presence of HBsAg by ELISA and RPHA

Group	Male	Female	Total
I. Samples from patients (GGH, GSH and ICHC)	77	33	110
II. Samples from Blood Bank (Healthy Controls) I	30	-	30
III. Samples from staff, Institute of Microbiology (Healthy control II)	6	9	15
Total:	113	42	155

Table - II

Results of ELISA and RPHA in groups I, II and III

Group	ELISA +	ELISA -	Total	RPHA +	RPHA -	Total
I	72	38	110	13	97	110
II	9	21	30	2	28	30
III	2	13	15	-	15	15
Total:	83	72	155	15	140	150

a) Among 110 patients, 72(65.4%) samples were positive by ELISA while HBsAg was detected only in 13 (11.8%) samples by RPHA.

b) Out of the 30 blood donors 9 (30%) were positive for HBsAg by ELISA while only 2 (6.6%) were positive by RPHA.

c) In the risk group only 2 had HBsAg in their blood as detected by ELISA while RPHA failed to detect.

Totally 83 (53.5%) samples out of 155 were positive for HBsAg by ELISA while only 15 (9.7%) were positive by RPHA.

Table - III

Sex Incidence of HBsAg (Male)

Group	ELISA +	ELISA -	Total	RPHA +	RPHA -	Total
I	48	29	77	8	69	77
II	9	21	30	2	28	30
III	2	4	6	-	6	6

Amoung 77 male patients 48(62.3%) were positive for HBsAg by ELISA while only 8(10.4%) were positive by RPHA.

Blood donors were all males.

In the risk group 6 were males and 2 out of them showed the presence of HBsAg by ELISA only.

Table - IV

Sex Incidence of HBsAg (Female)

Group	ELISA +	ELISA -	Total	RPHA +	RPHA -	Total
I	24	9	33	5	28	33
II			NIL			
III	-	9	9	-	9	9

Among the 33 female patients 24 (72.7%) showed HBsAg by ELISA and 5 (15%) were positive by RPHA. There were no female blood donors. Among the risk groups 9 were female and none had HBsAg as detected by both ELISA and RPHA.

ELISA was found to detect by far more percentages of HBsAg (ranging 62.3% to 72.7%) as compared to RPHA (1.4% to 15%) irrespective of sex.

Table - V

a) Age incidence of HBsAg (Male)

Group	0-10	11-20	21-30	31-40	41-50	51& above	Total
I	9	14	18	19	11	6	77
II	-	1	16	12	1	-	30
III	-	-	2	2	1	1	6
Total:							113

Out of 77 male patients more of positivity by ELISA was seen in the age group 21-30.

(The overall incidence of HBsAg seems to be in the age group 21-40).

Table-VI

b) Age incidence of HBsAg (Male)

Group	Age	ELISA +	ELISA -	RPHA +	RPHA -	Total
I	0-10	6	3	3	6	9
	11-20	9	5	-	14	14
	21-30	12	6	2	16	18
	31-40	12	7	-	19	19
	41-50	6	5	2	9	11
	51 & above	3	3	1	5	6

II	0-10	-	-	-	-	-
	11-20	-	1	-	1	1
	21-30	4	12	1	15	16
	31-40	5	7	1	11	12
	41-50	-	1	-	1	1
	51 & above	-	-	-	-	-
III	0-10	-	-	-	-	-
	11-20	-	-	-	-	-
	21-30	2	-	-	2	2
	31-40	-	2	-	2	2
	41-50	-	1	-	1	1
	51 & above	-	1	-	1	1

Table - VII

a) Age Incidence of HBsAg (Female)

Group	0-10	11-20	21-30	31-40	41-50	51 & above	Total
I	-	9	9	7	6	2	33
II			NIL				
III	-	-	1	6	2	-	9

Table - VII

b) Age Incidence of HBsAg (Female)

Group	Age	ELISA		RPHA		Total
		+	-	+	-	
I	0-10	-	-	-	-	-
	11-20	7	2	1	8	9
	21-30	7	2	2	7	9
	31-40	6	1	2	5	7
	41-50	4	2	-	6	6
	51 & above	-	2	-	2	2
II			NIL			
III	0-10	-	-	-	-	-
	11-20	-	-	-	-	-
	21-30	-	1	-	1	1
	31-40	-	6	-	6	6
	41-50	-	2	-	2	2
	51 & above	-	-	-	-	-

Studies in detection of HAV IgM

Total number studied	-	90
Children	-	50
Positive	-	2 children
		1 adult

Samples studied for the presence of HBsAg ELISA alone

Age	Male Total	Positive	Nagative	Female Total	Positive	Negative
21-30	20	3	17	36	2	34
31-40	15	-	15	5	-	5
41-50	10	3	7	-	-	-
51-60	4	2	2	-	-	-
	49	8	41	41	2	39

Samples studied for IgM Ab against HAV by ELISA

Age	Male Total	Positive	Nagative	Female Total	Positive	Negative
21-30	20	1	19	5	-	5
31-40	12	-	12	6	1	5
41-50	8	-	8	1	-	1
	40	1	39	12	1	11
Children	Total 23	3	20			

2.6 Work done at Haffkine Institute, Bombay:

- R.A. Deshmukh, N.G. Chanderkar, G.B. Akerkar, R. Rayanade, B.R. Bhate and M.V.N. Shirodkar.

Several outbreaks of viral hepatitis were reported from different villages in the State of Maharashtra. of which four interesting ones were studied by our team.

2.6.1 Investigation of an outbreak at Village Supne, District Karad:

This village is situated approximately 400 km. away from Bombay and in the vicinity of Karad, a district place. Over a short span of 10 to 12 days, 43 cases were reported in the month of September, 1985. Thirtythree per cent of these cases were males and 63% females, in the age range 20 to 50 years, while 4% were children. There was no mortality. A contaminated well was identified as a possible source of infection. This well was cordoned off with barbed wire. Hyperchlorination of drinking water was undertaken by the health authorities and the outbreak was controlled. Twenty representative serum samples were collected from these cases. HAVAb (ELISA) and HBsAg (ELISA) tests were carried out. All twenty (100%) samples turned out to be negative for both above HAV and HBV markers.

2.6.2 Investigation of outbreak at Village Bilashi, District Sangli:

In this village, 120 reported cases of viral hepatitis occurred, over a period of one-and-a-half months. This was found to be due to faecal contamination of well water after a spell of unseasonal rain, during the summer. Out of the total number of reported cases, 60% were males, 37% females, in the age-range 20 to 60 years and 3% children. Similar to the situation at Supne, the contaminated wells were identified and hyperchlorinated. Soon after commencement of the summer the incidence of hepatitis disease declined. However, sporadic cases were reported even after two months. Thirty serum samples were collected from these cases, out of which 4 (13%) were positive for HBsAg (ELISA). The remaining 26(87%) were negative for both HBV and HAV markers. Presumably these latter represented cases of NANB infection.

2.6.3 Investigation of an outbreak from Village Khopoli, District Raigad:

An outbreak of viral hepatitis was reported from village Khopoli, District Raigad. This village is approximately 120 km. from Bombay. A number of industries, including M/s. Zenith Steel Pipes, are situated in this small village. Most of the industries provide accommodation for their workers. The water supply for domestic as well as industrial purposes comes from the Tata Hydroelectric Power Station, situated atop a nearby hill. The processed water flows down as a stream. Each industrial unit has its own chlorination plant, as a part of its purification unit. Over a period of a month, starting from March, 1986 to April, 1986, six hundred and twenty-nine cases of viral hepatitis were reported from the Zenith Steel Pipe factory. Sixty-nine per cent of these cases were males and 31% females. The age group most affected was 10-20 years, followed by children below 10 years, then 20-30 and 30-40 years. The mortality was nil. It was learnt that the chlorination unit for the particular factory was not properly working during the above-mentioned period. The number of cases started decreasing after hyperchlorination of this water supply. Twenty-one serum samples were collected from this focus. They were subjected to HAV and HBV screening by the ELISA test. None of the samples was found positive for HBV, or HAV markers.

2.6.4 Outbreak at Village Mangalwedha, District Sholapur:

At this village, in the month of October, 1985, eighty-eight cases of viral hepatitis were reported. Sixty-three per cent of these cases were males, 32% females in the age group 20-60 years, while 5% were children. From the total cases reported, forty serum samples were collected and HAV and HBV markers studied. Of these eight (20%) were positive for HBV, while the remaining 32(80%) were negative for HAV, as well as for HBV markers. This outbreak followed unseasonal rains contaminating well water. The case rate gradually declined over a period of two months.

2.6. 5 Control of contacts of a fatal case of hepatitis B in a medico at Mahatma Gandhi Memorial Hospital, Bombay:

Medical and paramedical personnel from the Mahatma Gandhi Memorial Hospital, Bombay were tested for HBsAg and anti-HBs (ELISA) as a prerequisite for vaccination against HBV infection. This became mandatory for the Staff,because of the death of a Surgical Registrar, Dr. Anil Karandikar, who developed fulminant and fatal HBV infection. After developing hepatitis, he was found to be HBsAg-positive by the RPHA method. He was admitted to the I.C.C.U., but his condition deteriorated over a period of 2 weeks. Many of the medical and paramedical staff members came in contact with his blood or body fluids in the terminal stages of the disease. This created a panic amongst the Staff members. One hundred and seventy-two serum samples were collected. Out of these 3 (1.7%) were HBsAg positive (ELISA). The selection of samples was not random, the important factor being priority for vaccination and willingness on the part of individuals for vaccination.

All the 172 samples were screened for HBsAg (ELISA) and anti-HBs (ELISA). No sample was tested for anti-HBc-IgM. HBsAg was found in two individuals, while anti-HBs was detected only in one. Most of the susceptible staff members received H-B-VAX injections. Their immunological response after completion of 3 doses is being currently studied.

While most of the contacts (hospital) of the sentinel fatal case (Dr. Karandikar) have remained HBsAg-negative todate, a most interesting finding has been that his father had been found HBsAg-positive, over the last three months of follow up (monthly tests - ELISA) continues thus even today. Contrarywise, the other family members have been consistently negative.

Summary of Outbreaks of Viral Hepatitis in Maharashtra studied by Haffkine Institute (1985–1986)

Place	Cases reported	Cases studied	Peak Month(s)	Time-lapse onset and decline (months)	Presumptive cause	Causative agent (ELISA)		
						HAV (AbIgM)	HBV (HBsAg)	NANB (exclusion)
1) Supne	40	20	Sept. 1985	1	*Contaminated Step well	-	-	20(100)
2) Bilashi	120	30	Sept. 1985	1½	Unseasonal showers	-	4(13)	26(87)
3) Mangal-wedha	88	40	Oct. 1985	2	Unseasonal showers	-	8(20)	32(80)
4) Khopali	629	29	Mar-Apr. 1986	1	NANB (Water borne)	-	-	29(100)
5) MGM ** Hosptal Staff	172	172		-	-	-	3(1.7)	-

* Contamination confirmed by culture (bacterial).

** Healthy contacts - Figures in parentheses indicate percentage.

2.7 Work done at National Institute of Virology, Pune

2.7.1 Investigation of outbreaks and epidemics:

Investigation of an epidemic of viral hepatitis at Ahmedabad, June 1986:

- M.S. Chadha, V.A. Arankalle, C.L. Ramamoorthy, J.J. Rodrigues and K.M. Pavri.

Since January 1986 to May 1986, 1710 cases of viral hepatitis were reported with a CFR of 8.3%. Fifty-seven patients affected and their contacts from 3 maximally affected areas - Shahpur, Asarwa and Ghattodia - were examined and their blood samples were collected for aetiological studies. Eighty hospitalised patients were also studied. Among the 57 patients residing in the areas maximally affected, none showed positivity for HAV IgM (RIA) and HBsAg (ELISA). Six stool samples were collected to isolate any virus present. The results of serological tests indicate that this epidemic was neither due to HAV nor to HBV and was probably due to NANB virus(es).

Outbreak of viral hepatitis in Karnataka:

Twenty five sera from patients from an outbreak of viral hepatitis at Rabkavi-Banahatti village, 90 km from Bijapur, Karnataka State, were received for aetiological studies. 3/25 patients were adults. On epidemiological grounds it appears that NANB virus was responsible for the outbreak.

2.7.2 HBsAg screening in Indian Blood Banks: A comparative study of different systems - DCIEP, RPHA, ELISA and RIA:

- V.A. Arankalle, Z.R. Israel, L.P. Chobe and K.M. Pavri.

Sera from 1507 volunteer donors collected during 1985 by 2 blood banks in Pune were used for the tests. The results given in Table-I.

The lack of sensitivity of the DCIEP prohibits its routine application in blood banks. The enforcement of ELISA-RIA will eliminate 3.18% and 6% HBsAg positive units from voluntary and commercial donors respectively. However, it might still allow 2.1% and 9.8% probable

749
COMMUNITY HEALTH CELL
47/1, (First Floor) St Marks Road,
Bangalore

potentially infectious anti-HBc positive units from voluntary and commercial donors respectively to be transfused. Testing for anti-HBc is impractical. Taking into account the cost effectiveness i.e. ELISA cost (Rs.12 - 15 per test) and RPHA (Rs.8 per test) and allowing for 0.8 - 0.99% transfusion of HBsAg positive units, we feel that RPHA may be used in the blood banks in India till such time that inexpensive ELISA is made available.

2.7.3 **Surveillance of viral hepatitis in dialysis units:**
- M.S. Chadha, V.A. Arankalle, C.L. Ramamoorthy, D.M. Phule and J.J. Rodrigues.

The object of this study is to determine the cumulative prevalence and epidemiological pattern of dialysis associated hepatitis among patients undergoing maintenance haemodialysis and the staff members of the dialysis units of different hospitals in Pune.

Fifty five members of the dialysis units of 3 different hospitals in Pune and 13 patients of the same units were bled.

Two cases of clinical viral hepatitis were observed among the staff members and one among the patients. All the 3 cases were positive for HBsAg and had anti-HBc-IgM. Among the patients, the HBsAg prevalence was 5/13 (38.4%) which in comparison to the general population (HBsAg prevalence 3.29%) is found to be statistically significant ($p<0.001$). Anti-HBs prevalence was found to be 3/13 (23.08%).

Among the staff, the HBsAg prevalence was found to be 4/55 (7.27%) which is not statistically significant in comparison to the general population. Anti-HBs was found in 14/55 (25.45%) cases.

As the sample size is small, a systematic follow-up is being carried out.

2.7.4 **Visualisation and attempts to isolate NANB virus (es):**
- V.A. Arankalle, M.A. Sreenivasan, M.S. Chadha, S.P. Dhorje and Z.R. Israel.

Twenty eight stool samples collected from patients with suspected NANB hepatitis, and their contacts

during a focal outbreak at Ahmedabad were screened by electron microscopy. One sample showed the presence of virus-like particles (approx. 27 nm in diameter). In IEM, these particles showed immuno-aggregation with a pooled convalescent NANB serum fromKolhapur epidemic. Virus-like particles did not react with anti-HAV serum. This stool sample was taken to the NIH, Bethesda, for chimpanzee and marmoset inoculations. IEM experiments were repeated at the NIH with reproducible results. This virus did not hybridise with HAV and polio. Further experiments are in progress.

2.7.5 **Delta Infection:**

Delta infection among HBsAg positives from Pune:

- V.A. Arankalle, C.L. Ramamoorthy, S.P. Dhorje, Z.R. Israel, L.P., Chobe and K.M. Pavri.

a) Sera from 106 HBsAg carriers from commercial donor population, 103 HBsAg carriers from volunteer donor population, 20 HBsAg carriers from paediatric population (<15 years) and 33 HBsAg positive acute viral hepatitis patients were tested for anti-delta antibodies. None of the children and acute viral hepatitis patients were positive. 12/88 (13.63%) commercial donors and 7/103 (6.8%) volunteer donors were reactive for anti-delta antibodies.

Majority of the anti-delta positives were e antigen negative. None of the anti-delta positives were reactive for anti-HBc-IgM. 3/5 anti-delta positive donors were also positive for HBV DNA, indicating the possible reservoir for transmitting both HBV and delta viruses.

b) **Delta agent antibodies in immunoglobulins:**

Twenty five lots of NHIG from three different parts of India were tested for anti-delta antibodies using Abbott ELISA. 8/24 lots were positive for antidelta antibodies (33.3%). Ten lots were from Bombaybased companies (West India) and 4 were positive. These ten lots were from 1983-85 batches. Four lots were from a Madras based company (South India) and 2 were positive. These lots were from 1984-85 batches. Ten lots were from

a North India based company and two were found to be positive. One positive lot was from 1981 batch (1/3) while the other was from a 1983 batch (1/7). HBsAg was found to be present in 3/8 anti-delta positive NHIG. Like other plasma derivatives such as clotting factors, the infectivity of anti-delta positive NHIG is not yet proved. In India, most often, categorical diagnosis of viral hepatitis is not made before injecting NHIG to either patients or their contacts. It is, therefore, likely that delta-hepatitis may be transmitted in some HBsAg positive patients/carriers. It is therefore recommended that all the blood-products including immunoglobulins should be tested for HBsAg by a third generation test such as ELISA or RIA to reduce the risk of transmitting HBV to the susceptibles and delta virus to HBsAg positive patients/carriers.

2.7.6 **Studies on HBV DNA:**

- V.A. Arankalle, S.P. Dhorje and C.L. Ramamoorthy.

Recently, HBV DNA has been shown to be a quantitative marker of infectivity of HBV containing samples. Infectivity of HBsAg positive volunteer and commercial donors was assessed in terms of presence of HBV-DNA or e antigen. 14/32 sera from volunteer donors and 20/40 sera from commercial donors were positive for HBV-DNA. e-antigen testing was carried out on 40 sera from commercial donors. 19/20 HBV-DNA positives were positive for antigen. 19/20 HBV-DNA negatives were also negative for e-antigen. 1/20 HBV-DNA was positive for antiHBC-IgM and e-antigen.e antigen.testing of sera from volunteer donors is under progress.

2.7.7 **Diagnostic significance of anti-HBc-IgM in patients of acute viral hepatitis:**

- A. Sehgal, V.A. Arankalle, C.L. Ramamoorthy, S.P. Dhorje, D.M. Phule, Z.R. Israel and K.M. Pavri.

Hospitalised cases of acute viral hepatitis occurring sporadically in Pune during 1978-83 were investigated for aetiological diagnosis. All those negative for the diagnostic seromarkers of hepatitis A virus (anti-HAV-IgM) were tested for the seromarkers of hepatitis B virus.

Thirteen of 72 (18%) HBsAg positive patients were recognised to be carriers of HBsAg as they had no detectable antiHBc-IgM antibodies in their sera. Of the 139 HBsAg negative patients, 25(17.9%) reacted for anti-HBc-IgM indicating that they were actually patients of HBV. Approximately 7.8% of the patients during the first week after onset of symptoms and with no demonstrable HBsAg in the blood could be diagnosed as acute case of HBV on the basis on anti-HBc-IgM detection. The proportion of patients thus recognised increased by the third week and later, when as many as 25% of the patients could be diagnosed as suffering from acute HBV infection. Patients of acute viral hepatitis in India often seek hospitalisation late after onset of clinical symptoms. By this time, they may either seroconvert to demonstrate anti-HBs or be in the core-window period during which HBsAg is not detected in the blood and anti-HBs has not as yet reached demonstrable levels. Anti-HBc-IgM is the only reliable seromarker of recent HBV infection in such patients. It is therefore recommended that in epidemiological studies screening for anti-HBNc-IgM should be carried out for aetiological diagnosis before labelling the patients as having NANB hepatitis.

2.7.8 **Long-term clinical and serological follow-up on carriers of HBsAg:**

- V.A. Arankalle, M.S. Chadha, L.P. Chobe and D.M. Phule.

During 1985-86, 64 HBsAg carriers were enrolled in the study. A history of jaundice was given by 11 (17%); H/O blood transfusion was given by 16/64 (25%); H/O surgery was given by 5/64; H/O prolonged intramuscular therapy was given by 21/64. Only two carriers had marginally elevated ALT values. Liver was palpable in 17/64 cases. These carriers have been followed up for a period of 3-9 months. Two of them have seroconverted to antiHBs without apparent symptoms. Out of 12 spouses bled, two were positive for HBsAg, 3 for anti-HBs whereas the remaining 7 were still susceptible to HBV. In order to determine the outcome of HBsAg carriers with or without delta infection, all the carriers were tested for anti-delta antibodies using Abbott RIA. None was found to be positive. All the sequential samples are being

tested for HBsAg-IgM complexes and αfetoproteins using ELISA. Their electrophoretic pattern is also being studied. 70.3% of the carriers were anti-e positive in the beginning of the study. Further testing and follow up is in progress.

2.7.9 **Screening of high risk groups for HBsAg:**
- M.Bose, A. Divekar, Z.R. Israel, L.P. Chobe, C.L. Ramamoorthy, D.M. Phule and J.J. Rodrigues.

Twenty eight sera from prostitutes from Pune and 84 sera from prostitutes from Bombay attending STD Clinics were screened for HBsAg and anti-HBs. HBsAg positivity was found 0/28 and 3/84 (3.57%) whereas anti-HBs was present in 19/28 (67.8%) and 50/54 (92.5%) respectively. Exposure to HBV was significantly higher in females (50.49%) than that in males (36.29%) attending STD Clinics ($p<0.001$). Further testing of these sera is in progress.

2.7.10 **Service and supply:**

Confirmation of doubtful results got at various blood banks in Pune.

Table - I

HBsAg positivity among volunteer donors using different methods

Type of RPHA	Total No. of samples tested	Positive by RPHA	*Positive by ELISA (NIV) and RIA (Abbott)	*Positive by RPHA & ELISA	Positive by RPHA alone
A	494	24	15*	11	13
B	539	26	19	14	12
C	504	18	14	9	9
Total:	1507	68	48	34	34

* Same sera were positive by both the tests.

2.8. Work done at B.J. Medical Collge, Ahmedabad

During the period January - July, 1986, 861 sera samples of jaundice cases received from Isolation Ward were tested by RPHA for the presence of HBsAg and 24.5% of them were found to be positive.

A total of 14,213 sera samples from jaundice patients - both indoor, outdoor and blood donors were tested for HBsAg by RPHA method and 5% were found to be positive.

A total of 3725 blood donors were tested for HBsAg by RPHA and 2% were found to be positive. (Table-I)

Table - I

Blood Bank (donors) Jaunary - July, 1986

Months	Total No. of samples	No. +ve for HBsAg	Percentage
January	716	18	2.5
February	705	23	3.2
March	411	8	2.0
April	526	4	0.7
May	486	14	3.0
June	485	6	1.2
July	396	1	0.3
Total:	3725	74	

Marked fall in positivity rate in June and July is due to strict vigilance kept on professional donors who came as relatives of the patients. In March and April replacement was not insisted which also kept professional donors out of blood bank.

During the period January - July, 1986, a total of 5725 cases with 326 deaths were reported from all the districts of Gujarat. The cases occurred in all months to almost the same extent except in May and June when there was slight increase.

2.9 Work done at Postgraduate Institute of Medical Education and Research, Chandigarh

- S.R. Pal and S.R. Prasad.

2.9.1 Incidence of HBsAg among patients:

The regional centre at Chandigarh screened 1266 patients with various hepatic and related diseases for the prevalence of hepatitis B surface antigen (HBsAg) during 1985-86. Initially, Discontinuous counter current immuno-electrophoresis was employed and later it was replaced by the micro ELISA technique. HBsAg was detected in 152(12%) of the patients tested.

The incidence of HBsAg in different diagnostic categories is presented in table-I.

Among the acute hepatitis patients 269 were adults and 104 were children HBsAg was detected in 41(15.2%) adults and in 8(7.7%) children.

The monthwise incidence of acute hepatitis and the positivity of HBsAg is presented in table-II.

2.9.2 Delta hepatitis virus infections in Chandigarh region:

Eighty one representative serum samples from HBsAg positive patients of 1984 and 1985 were tested for the presence of Delta hepatitis virus infection by employing the Deltassay kits of Noctech Ltd., Ireland. Delta virus antigenaemia was detected in 7 of the 49 (14.3%) of Acute hepatitis B patients, 3 of 8 (37.5%) chronic renal failure patients, and 1(4.6%) of 22 chronic hepatitis patients and 1 (10%) of the 10 healthy voluntary blood donors. Three Delta infection positive patients were children. There was no history of intra-venous drug abuse in any. It was considered that percutaneous delta infection may be occuring and Delta agent may be endemic in this geographical region.

2.9.3 Prevalence of HBeAg in HBsAg positive patients:

By employing the Abbot's HBeAg ELISA kits, HBeAg was detected in 15 (30.6%) of 49 Acute sporadic hepatitis B, 3 (37.5%) of the 8 chronic renal failure patients, 9 (40.9%) of 22 chronic liver disease patients and 3 (30%)

of 10 healthy voluntary blood donors.

2.9.4 **Prevalence of markers of HBv infection among medical persons at P.G.I., Chandigarh:**

Blood samples from 202 medical personnel: 25 doctors, 130 nurses, 39 laboratory technicians and 8 laboratory attendants, were tested for markers of Hepatitis B virus (HBV) infection by the Enzyme Linked Immunosorbant Assay. Hepatitis B surface antigen (HBsAg) was detected in 8(4%) and antibody to HBsAg was detected in 22(10.9%). None of the HBsAg carriers was positive for Hepatitis B e Antigen but antibody to Hepatitis B e antigen was detected in 5(62.5%). The relative prevalence of HBsAg was 1.6 compared to that of the normal population.

Doctors and laboratory attendants showed a higher prevalence of HBV infection (20% and 25% respectively) compared to that of Nurses and laboratory technicians (13.9% and 12.8% respectively). Doctors also reached this high prevalence rate by the end of the first five years of professional experience.

Most of the HBV infections were subclinical. HBV infections could only account for 15% of cases with the past history of jaundice.

2.9.5 **Prevalence of HBsAg among healthy voluntary blood donors:**

During 1985-86 1949 adult healthy voluntary blood donors were screened for the prevalence of HBsAg by the Micro ELISA technique. HBsAg was detected in 68-(3.8%) of the donors tested.

2.9.6 **HAV Infections among children:**

Thirty one children with acute sporadic hepatitis were tested for HAV AB IgM, employing the Abbots kits. The presence of HAV AB IgM indicates recent infection with hepatitis A virus. HAV AB IgM was detected in 24(77.9%) of the children tested. The monthwise results of HAV AB IgM testing are presented in table-III. The positivity seen almost in every month tested indicates the endemicity of HAV infections in this region among children. Our earlier studies had shown that HAV infections are uncommon among adults.

Table - I

Incidence of HBsAg in different diagnostic categories

Diagnostic category	No. tested	No. Positive	% Positive
Acute viral hapatitis	373	51	13.7
Fulminant hepatitis	19	6	31.6
Hepatic Encephalopathy	37	5	13.5
Chronic hepatitis	57	5	8.8
Cirrhosis of liver	80	20	25.0
Alcoholic liver Disease	13	1	7.7
Neonatal hepatitis	38	2	5.3
Indian child-hood cirrhosis	15	1	6.7
Chronic Renal Disease	163	24	14.7
Miscellaneous	471	37	7.9
Total:	1266	152	12.0

Table - II

Monthwise incidence of acute viral hepatitis and HBsAg positivity

Months	ADULTS			CHILDREN		
	No. tested	No. HBsAg positive	% Positive	No. tested	No. HBsAg positive	% Positive
1985						
July	23	2	8.7	8	0	0
August	21	4	19.0	12	2	16.7
September	24	4	16.7	6	0	0
October	28	2	7.1	9	1	11.1
November	41	2	4.9	16	2	12.5
December	26	6	23.1	11	1	9.0
1986						
January	15	1	6.7	10	1	10.0
February	17	4	23.5	7	1	14.3
March	12	2	16.7	5	0	0
April	16	2	12.5	2	0	0
May	18	6	33.3	2	0	0
June	28	6	21.4	16	0	0
Total:	269	41	15.2	104	8	7.7

Table - III

Monthwise results of HAV AB-M testing on acute viral hepatitis of childhood

Months	No. tested	No. positive	% positive
1985			
July	4	0	0
August	1	1	100
September	-	-	-
October	-	-	-
November	-	-	-
December	-	-	-
1986			
January	1	1	100
February	4	4	100
March	4	4	100
April	1	1	100
May	-	-	-
June	16	13	81.3
Total:	31	24	77.4

2.10 Work done at Institute of Preventive Medicine, Hyderabad

- K. Rajyalakshmi.

Blood samples were collected from patients, suffering from Jaundice and clinically diagnosed as viral hepatitis. In the present survey sample collection was limited to twin cities of Hyderabad and Secunderabad and included patients attending the Government Fever Hospital, Gastroentritis unit of Osmania General Hospital, Government Unani Hospital, Homeopathic Research Centre and Ayrvedic Hospital.

A total of 400 blood samples were screened. The study included 389 patients, with history of fever, pain in the abdomen, loss of appetite and jaundice. The duration of illness varied from few days to two months. These cases were clinically diagnosed as cases of viral hepatitis. There was one of nonicteric hepatitis. History of blood transfusion was forthcoming only in 11 cases (3%) cases, and in 35 cases (9%) there was history of receiving injections prior to development of Jaundice.

A preliminary biochemical tests were performed regarding the serum bilirubin level and Van Den Berg test. The alkaline phosphatase levels and, Thymol turbidity tests were also performed in most of the cases. All the samples showing raised serum bilirubin level were processed for Hepatitis B and A Non A Non B was determined by exclusion.

Among the 389 cases of Viral Hepatitis studied 241 (12.0%) were males and 148(38.0%) were females. The serum bilirubin levels varied from 1.0 to 27.7mg% with an average of 6.8 mg.%. 278(71.2%) of the cases were positive for HBsAg; 22(5.7%) were positive for HAV IgM antibodies. By exclusion (23.1%) were identified as non-A non-B hepatitis.

3. ANNEXURES

Annexure - I

List of Participants

1. Dr. K. Pavri,
   Director,
   National Institute of Virology,
   Pune

2. Dr. Y.K. Joshi,
   Assistant Professor,
   All India Institute of Medical Sciences,
   New Delhi

3. Dr. B.M. Gandhi,
   Senior Research Officer,
   All India Institute of Medical Sciences,
   New Delhi

4. Dr Ranjana Deshmukh,
   Haffkine Institute,
   Bombay

5. Dr. M.S. Chakraborty,
   Professor & Head of Department of Virology,
   School of Tropical Medicine,
   Calcutta

6. Dr. A.K. Chakraborty,
   Professor & Head, Department of Epidemiology,
   All India Institute of Hygiene and Public Health,
   Calcutta

7. Dr. K. Rajyalakshmi,
   Director,
   Institute of Preventive Medicine,
   Hyderabad

8. Dr. C.S. Lakshminarayana,
   Professor of Microbiology and Director,
   Madras Medical College,
   Madras

9. Dr. Sheikh Mohammad,
Madurai Medical College,
Madurai

10. Dr. Y. Dayal,
State Virologist,
Directorate of Health Services, U.P.
Lucknow

11. Dr. S. Pattanayak,
Medical Officer, WHO/SEARO,
New Delhi

12. Dr. K.K. Dutta,
A.D.G., (AIDS),
Directorate General of Health Services,
Nirman Bhavan,
New Delhi

13. Dr. P.N. Sehgal,
Director,
National Institute of Communicable Diseases,
Delhi

14. Dr. K.B. Banerjee,
Deputy Director,
Epidemiology Division,
National Institute of Communicable Diseases,
Delhi

15. Dr.(Mrs.) Sudershan Kumari,
Deputy Director,
Microbiology Division,
National Institute of Communicable Diseases,
Delhi

16. Dr. (Mrs.) Krishna Ray,
Assistant Director,
Microbiology Division,
National Institute of Communicable Diseases,
Delhi

17. Dr.Debashish Chattopadhya,
Assistant Director,
Microbiology Division,
National Institute of Communicable Diseases,
Delhi

18. Dr. V.J. Mahadik,
Assistant Director,
Epidemiology Division,
National Institute of Communicable Diseases,
Delhi

19. Dr. (Mrs.) Mary Sebastian,
Senior Medical Officer,
Microbiology Division,
National Institute of Communicable Diseases
Delhi

20. Dr. S.K. Das,
Senior Medical Officer,
Epidemiology Division,
National Institute of Communicable Diseases,
Delhi

21. Dr. Arvind Rai,
Dy. Assistant Director,
Microbiology Division,
National Institute of Communicable Diseases,
Delhi

Annexure - II

Annual Review Meeting on Viral Hepatitis Surveillance Under the National Viral Hepatitis Surveillance Programme on 25 - 26 September, 1986

PROGRAMME

25 September 1986

10.00 to 10.30	Registration
10.30 to 11.05	Inauguration
11.05 to 11.30	Tea
11.30 to 12.30	Viral Hepatitis Surveillance in India - Importance and Impact. by Dr. N.C. Nayak, Prof. & Head, Deptt. of Pathology, AIIMS, New Delhi - WHO Committee (Guest Lecture).
12.30 to 01.00	Discussion
01.00 to 02.00	Lunch
02.00 to 03.45	Presentation of Reports by participants, Chairperson - Dr. S. Pattanayak, WHO.
03.45 to 04.00	Tea
04.00 to 06.00	Presen tatio n of Reports by participants (contd.)

26 September 1986

10.00 to 10.30	Lecture "Problem and Prospects of Viral Hepatitis Surveillance in India" by Dr. K.K. Dutta, ADG, DGHS, New Delhi
10.30 to 11.00	Lecture - Role of Sentinel Centres in disease surveillance with special reference to Viral Hepatitis Surveillance by Dr. P.N. Sehgal, Director/ Dr. K.B. Banerjee, Dy. Director (Epid.), NICD, Delhi
11.00 to 11.30	Difficulties faced in implementation of National Viral Hepatitis Surveillance Programme (Epidemiological). Chairperson - Dr. P.N. Sehgal, Director, NICD. Co-chairperson - Dr. K.B. Banerjee, Dy. Director (Epid.)

26 September 1986 (contd.)

11.30 to 11.45	Tea
11.45 to 01.00	Difficulties faced in implementation of National Hepatitis Surveillance Programme - Laboratory aspect.
	Chairperson - Dr. K. Pavri, Director, NIV, Pune.
	Co-chairperson - Dr. (Mrs.) S. Kumari, Dy. Director (Microbiology), NICD, Delhi
01.00 to 02.00	Lunch
02.00 to 04.00	Future Plan of Action
	Formulation of Recommendations.
	Chairpersons - Dr. P.N. Sehgal and Dr. S. Pattanayak
04.00 to 04.30	Tea

Annexure - III

Surveillance of Viral Hepatitis in India
Importance and Impact

N.C. Nayak, Prof. & Head
Department of Pathology
All India Institute of Medical Sciences
New Delhi

The control and management of any disease can only be planned if a strong information base is available on certain aspects of the disease in the human, on natural or experimentally induced disease in different categories of animals including usual laboratory animals and on basic data regarding the nature and biology of agents, host defence mechanisms and diagnostic tests. Surveillance of a communicable disease like viral hepatitis requires identification of infection and disease, investigation of its epidemiology and study of the natural history. These in turn will help in the assessment of infection and disease loads, identification of at risk groups in the community, determination of sources and routes of infection and delineation of areas for further study and research. Cumulative information from all these has an outreach to the general population for planning the control strategies. Errors in proper recognition of the disease is likely to put in considerable amount of inaccurate data into the analysis. The identification of viral hepatitis depends on characteristic clinical, biochemical and whenever possible pathological features, identification of the causative agents whenever this can be achieved and proper serological tests. The latter currently is the most important method of diagnosing the type of viral hepatitis since identification of the causative agents is not only very time consuming but is also expensive. However, the test systems used for serological diagnosis of viral hepatitis must be based on choosing the most appropriate ones that can be used by different surveillance and sentinel centre. Such a system should have a cumulative high score on specificity, sensitivity, reproducibility, availability, cost and simplicity and relative accuracy of test performance.

Once identification is proper, the epidemiological

and other data collected can be reliably analysed. On the other hand misidentification of the disease will not only put in spurious disease into the category of viral hepatitis but will also miss out the real disease occuring in the community in variable proportions. Presently sero-diagnostic tests are available for the identification of acute infection by hepatitis A virus (HAV), hepatitis B virus (HBV) and the hepatitis Delta virus (HDV). If these types can be convincingly excluded in a disease otherwise compatible with acute viral hepatitis, then the condition is categorised as the socalled nonA non-B hepatitis (HNANBV).

As stated earlier the inputs on the above issues will result in identifying the pattern and the magnitude of the disease and the infection in a community and will therefore help in planning control strategies like public health and other measures including vaccination. HAV infection is common in India as indicated by very high frequency of relatively high titre sero-positivity for protective immunoglobulins of the IgG class against HAV in the general population. In fact some of these studies conducted in the country indicate that above the age of 15 years approximately 90% or more of the Indian population are immune to the disease. This is reflected very well in the clinical setting of viral hepatitis in the sense that only a very small proportionof sporadic acute viral hepatitis in adults can be attributed to HAV (not more than 10%) and that epidemics of HAV are almost unknown in our country. HBV infection is also endemic in India, a total of approximately 56% to 58% of adults showing evidence of past infection with the virus (HBsAg positive/anti-HBs positive/antiHBcIgG only positive in serum). The magnitude of past infection with HNANBV cannot be assessed because of the lack of specific serological markers. Several studies have now shown that among sporadic viral hepatitis the majority (about 55%) belong to the category of non-A non-B hepatitis. Approximately 35% (about a third) are due to HBV infection and only about 10% is attributable to HAV infection. Almost all the epidemics reported in India since the large Delhi epidemic of 1955-56 are attributable neither to HAV nor to HBV, thus qualifying for the HNA-

NBV infection. It therefore appears that in fact the NANB hepatitis emerges as the major public health problem in our country.

Regarding the at risk groups, children are most susceptible to the HAV infection though fortunately this disease is the most benign form of viral hepatitis and does not lead to chronicity. Mortality also is very low. The groups at high risk for HBV infection are infants born to HBV carrier mothers (particularly those carrying HBsAg and HBeAg), health professionals and workers in areas and laboratories dealing with patients of hepatitis or material from them and renal dialysis units. Drug abusers and persons receiving blood which has not been screened for hepatitis B viral infection are also at high risk, as are people who are injected with unsterilised syringes and needles. HAV infection occurs through the oral route, HBV infection mostly through the parenteral route, also occurring by close person to person contact while the NANB infection can either be through the parenteral (as in the post-transfusion NANB hepatitis) or through the oral route (as possibly in most cases of epidemics in India).

Perinatal transmission of infection from mothers to infants occurs in cases of HBV. In one of the studies recently carried out in Delhi it has been shown that not more than a third of the total adult HBV carries are attributable to infection having coming during the perinatal period from carrier mothers. Most other individuals, probably acquire the infection somewhere between early childhood and young adulthood. Studies are necessary to identify the time at which most of the infections occur so that control with vaccination can be properly planned.

In conclusion it is clear that in a large country like ours with varied socio-cultural and religious practices proper surveillance of viral hepatitis is very important to clearly delineate public health measures needed to control and manage the disease and its complications.

Annexure - IV (A)

NATIONAL INSTITUTE OF COMMUNICABLE DISEASES, DELHI

Proforma for Hepatitis Surveillance

Patient's name_____Age____yrs. Sex - M/F

Hosp. Reg. No._____

Residential Address_____

_____

Provisional diagnosis Viral Hepatitis/others.

If female: Pregnant/non-pregnant

H/O Present illness_____

Duration of illness

- Blood transfusion Yes/No Vaccination Yes/No
- Tatooing ___ ___ Injection ___ ___
- Previous Hosp. Admission _____

Outcome_____ Died/survived

Lab. Investigations:

Biochemical tests: Serum bilirubin - SGOT - SGPT

Any other test:

Annexure - IV (B)

NATIONAL INSTITUTE OF COMMUNICABLE DISEASES, DELHI

Proforma for use of Blood Banks

i) Name & Location of the Blood bank:

ii) Timings of blood bank:

iii) Govt./Semi Govt./Private:

iv) Average capacity of the hospitals to which the bank caters:

v) Criterion used for selection of donor:

a)

b)

c)

vi) Source of blood (Voluntary/professioanl donor)

vii) Screening Tests carried out in routine (Tick mark).

a) For HBsAg (Australia antigen) - Yes/No

b) V.D.R.L. - Yes/No

c) M.P. - Yes/No

viii) If answer to (vii a) is yes, details thereof:

ix) Incidence of PTH (Post Transfusion Hepatitis) observed?

OTHER PUBLICATIONS ON VIRAL HEPATITIS FROM NICD, DELHI

1. Laboratory Manual on Viral Hepatitis.
2. Manual on Epidemiological Surveillance of Common Epidemic Prone Diseases (including Viral Hepatitis).
3. Bibliography on Viral Hepatitis.
4. Communicable Disease Bulletin - A Quarterly Publication Containing news regarding Viral Hepatitis.
5. Viral Hepatitis Surveillance - 1985.